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THE GROWTH OF THE METAL INDUSTRIES IN EDMONTON

by

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "The Growth of the Metal Industries in Edmonton," submitted by Michael Anthony Crowston in partial fulfilment of the requirements for the degree of Master of Arts.

ABSTRACT

The objective of this study is to analyze the urban growth and intra-urban changes of the metal industries in Edmonton. Since Edmonton has predominantly been a service and administrative centre little research has been done with respect to the development of manufacturing. In the first part of the twentieth century the metal industries were oriented primarily to the local market. However, the development of the oil industry and subsequent growth of Edmonton saw a change in the structure of the industries, expansion of markets and changes in the intra-urban location. The present study is concerned in tracing these changes in the metal industries from 1910 to 1969.

In order to obtain data upon the growth of the metal industries, a 30 percent random sample of establishments were interviewed. These interviews were designed to determine the main factors influencing an Edmonton location and the roles they played in the original location decision and the present economic environment. Further, the intra-urban pattern of location was studied to discover if there had been any trends toward concentration or dispersal within the city. The sample firms were asked the reasons for any previous relocation within the city and to evaluate their present location.

On the basis of data obtained, it was found that the

industries had experienced a substantial growth since the discovery of oil in 1947 and the resultant growth of the city. The attraction of markets was the main reason for establishments locating in the city. Over time, most firms in the metal industries had increased the spatial extent of their markets. The personal factor also played an important role in the location decision. Over the period from 1910 to 1969 the industries had concentrated in the north-west and south-east sectors of the city, with many firms relocating due to a need for more space as their business expanded.

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CHAPTER I

INTRODUCTION

Aim of Study

During the twentieth century the growth of Edmonton has been propelled mainly by its function as a service centre and to a lesser extent by its function as a manufacturing centre. In the first half of this century manufacturing grew slowly and steadily. By contrast, the rate of growth has accelerated since 1945.

Originally Fort Edmonton was a depot for the Prairie fur trade and later became the service centre for Northern and Central Alberta (Lee, 1963, p. 8). The earliest forms of manufacturing developed as a part of the service function. In 1890 the city fathers realised that increased industrial development was necessary for the continued growth of the city (Dale, 1969, p. 22). The majority of manufacturing up to 1914, including the metal industries, was small scale and served the city inhabitants and immediate hinterland. The exceptions were sectors of the food and beverage industries which apparently had both national and international markets (Lee, 1963, p. 22).

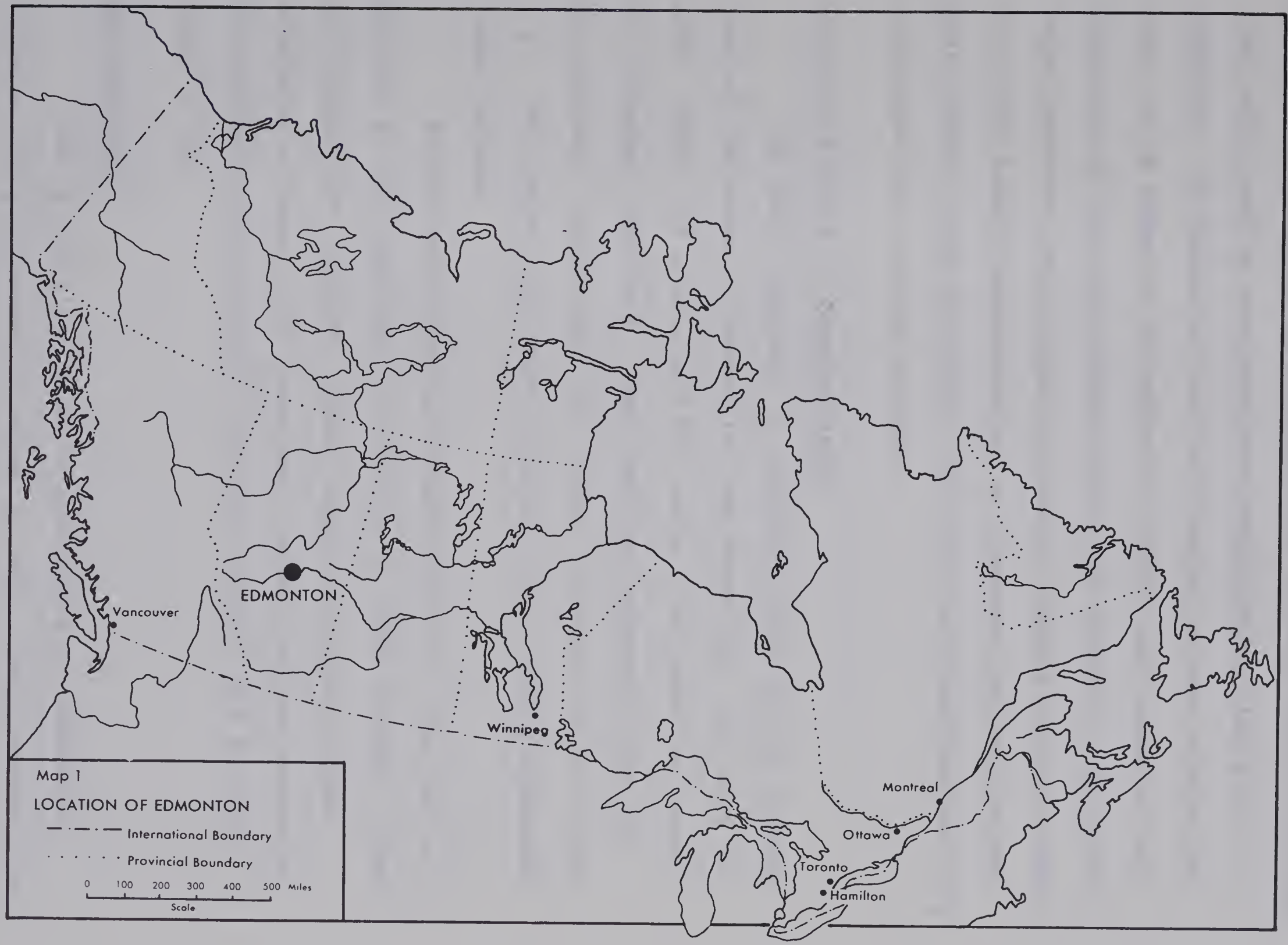
Previous studies on Edmonton's urban economic base showed the major function remaining that of a service centre (Maxwell, 1964 and Anderson, 1968). However, the amount of

manufacturing had increased. The numbers employed in manufacturing rose from 10,061 in 1951 to 15,005 in 1961; while over the same period Edmonton's population rose from 159,631 to 376,925 (Census of Canada, 1951-1961). This rapid growth apparently was propelled by the development of the oil industry after 1947. The presence of the oil industry created a demand for equipment from the metal industries and the growing population of Edmonton led to an increased demand for metal products in general.

Before World War II the metal industries served local markets and growth was unspectacular. In the first part of the twentieth century this was to be expected, since Edmonton was in a relatively isolated position with regard to the rest of Canada (Map 1). Consequently, the metal industries would find themselves at a disadvantage in marketing their products nationally compared to other locations in Central Canada. Its isolation appeared to preclude any major expansion.

The oil discoveries in 1947 led to the rapid growth of Edmonton and the metal industries from 1950 to 1969. Many local entrepreneurs and companies from outside Alberta established plants to supply the oil and construction industries. In a short time the metal industries had grown and expanded their markets.

The structure of the metal industries had changed and the objective was to study the characteristics and causes of change at both the urban and intra-urban levels. Emphasis was


EDMONTON
Vancouver
Winnipeg
Montreal
Ottawa
Toronto
Hamilton
Map 1
LOCATION OF EDMONTON
International Boundary
Provincial Boundary
0 100 200 300 400 500 Miles
Scale

placed on attempting an evaluation of certain location factors that might lead to manufacturers establishing plants in Edmonton. In examining the distribution pattern within the city, it is hoped to determine the nature and causes of any evolution of the intra-urban pattern of location. The intra-urban patterns are analysed to observe whether there has been any trend towards concentration or dispersal and to discover what factors, such as zoning, land rent, and land availability influenced the location pattern.

Location Factors in Manufacturing

The early approach to location theory was an assessment of the costs of assembling raw materials, the costs of land, labour and power, and the costs of shipment to market at different locations. Such theories suggested that the entrepreneur decided upon the optimal location for the plant, i.e., the lowest total cost location, after having appraised these factors.

Recent technological advances however, have led to a decline in the importance of certain of these factors. Power and labour have achieved almost complete mobility, being available at nearly all locations, thereby neither enhancing nor detracting from possible locations (Estall and Buchanan, 1961, p. 62).

Raw Materials

One of the first sets of principles on industrial location was put forward by Weber in 1909. This stressed the

potential importance of raw materials in deciding location. Weber theorized industries utilising bulky raw materials that underwent a large weight loss in processing would locate at or near their source of raw materials. At the time the Weberian theory originated heavy industry was generally found at the source of raw materials. These industries had a high material index, that is, the weight of raw materials was greater than the weight of the finished product (Weber, 1909).

In many forms of secondary manufacturing in the twentieth century, manufacturing processes consist of assembling parts or components or fabricating semi-processed materials. These industries have a low material index since the "materials" undergo little weight loss and are transported at lower rates than the finished products. Consequently, these industries are attracted by the pull of markets. The Edmonton metal industries are an example of this freedom from the pull of raw materials. All ferrous and non-ferrous materials used in the Edmonton metal industries originate from either Eastern Canada, Japan (via Vancouver) or the United States. The lack of local raw materials suggests other location factors play an important role in the decision to locate in Edmonton.

Transportation

Three other factors are labour, market and transfer costs. According to early theories transfer costs play a major role in industrial location. In reality freight rates are

relatively low for raw materials and higher for finished products (Chinitz, 1960, pp. 136-140). Knowing the freight rate structure, entrepreneurs attempt to find a location where transport costs are at a minimum. Further complications may exist when freight rates are structured on a single "basing point," such as Pittsburgh Plus, or on a "multi-basing" point schedule (Warren, 1966).

As with many forms of secondary manufacturing in Edmonton, little emphasis is placed on transfer costs as a location factor (Barloon, 1965, p. 169). Manufacturers in the metal industries appear to think large distances from other manufacturing centres provides some form of protection, whilst the proximity to market plays a major role in the location decision.

Market

The increasing mobility of power, labour and capital would seem to have allowed secondary manufacturers a greater degree of freedom in the choice of location. However, it has only led to an increase in the pull of a market location. A market location offers the advantages of agglomeration economies, close contact with consumers, minimum freight costs on finished products and an adequate supply of labour. Certain firms serving national markets may find it advantageous to concentrate production in one plant located in the largest market area. This is done in the knowledge that economies of scale offset transportation costs. In time distant markets may expand, resulting in it becoming unprofitable to serve all

markets from one major plant. To overcome this, branch plants are set up to serve the expanding markets (Logan, 1966a, pp. 276-277).

For a small entrepreneur a location in an urban market appears the most feasible location to establish a plant. Small entrepreneurs lack the resources for soliciting customers in distant markets and close proximity to local markets is of major importance. Raw materials will often be obtained through local suppliers and transport costs on materials and finished goods form only a small percentage of total costs. Often the influence of a market-oriented location is the only economic factor entrepreneurs are really aware of and it is repeatedly and closely associated with the personal considerations of entrepreneurs.

In three recent studies, location at a major market was the prime reason for the presence of most firms. These firms, studied in Michigan by Katona and Morgan (1952), stated that advantages of being in close proximity to market would not lead to relocation out of the state (Katona and Morgan, 1952, p. 72). Logan's (1966b) study of Sydney stressed the importance of a location near to market. Logan maintained that markets were the economic factor considered most by manufacturers (Logan, 1966b, p. 455). The most recent study, by Field and Kerr (1968), again emphasises the importance manufacturers place on market proximity in their location decision.

Labour

In industries where a large percentage of processing costs are comprised of labour inputs it is desirable that such industries locate where there are large labour markets. Some locations can cause problems for the manufacturer. Cities with a large pool of skilled labour may have a long history of labour disruptions through labour being highly organized. In such situations manufacturers find they may have to pay high wages and deal with powerful trade unions.

Conversely, to avoid these problems, manufacturers may decide to locate in areas where recent economic setbacks or continued economic retardation provide a large, low-wage labour force. Entrepreneurs may find a favourable environment in non-industrial cities where rapid economic growth has created an ample labour market. In regions of economic setback the disadvantages of high transfer costs, distance from raw materials and market may offset the advantages of a relatively abundant supply of cheap labour. All these situations present problems to industry.

The Michigan (Katona and Morgan, 1952) and Toronto (Field and Kerr, 1968) studies revealed the availability of skilled labour as an asset to the entrepreneur. However, the high degree of organization and high wage levels in Michigan were considered disadvantages of that particular location. Despite this, it was observed that smaller firms were less likely to be faced with labour disruptions (Katona and Morgan, 1952, pp. 72-76). In Sydney manufacturing's rapid growth led

to a shortage of labour, but manufacturers still located in the city as they perceived a labour potential in the large population of the metropolis (Logan, 1966b, p. 455).

Edmonton is a non-industrial city with a rapidly expanding urban population. This generally provides industry with an ample source of labour. Research showed that the majority of firms interviewed had no difficulty in recruiting their labour forces. However, this labour force was mainly unskilled and many firms had to provide some degree of training for their employees.

The Personal Element

Often the role of the personal element is ignored in industrial location studies. It can take many forms and is most often relevant in the decisions of the small manufacturer. Katona and Morgan's Michigan study showed the personal element to be the most important factor in the location decisions of the firms they interviewed (Katona and Morgan, 1952, p. 75). Field and Kerr (1968) acknowledge the role of the personal element but devote little time to it and attempt no analysis. Field and Kerr argued that because of the subjective nature of this factor it would be impossible to analyse (Field and Kerr, 1968, p. 62). Logan (1966b) mentions the personal element also and its importance in the location decision, but he again attempts no analysis.

Factors such as market and the personal element will be studied in the Edmonton metal industries. The results show that the personal element plays, and did play, an important

role in the decision to locate in Edmonton. Some analysis of the personal element will be attempted, for it would appear to be a neglected factor in industrial location, although empirical studies show it has a major role in the location decisions of small manufacturers.

Thesis Content

The study consists of four parts. Chapter II describes the growth of Edmonton and particularly the growth of the metal industries. The second section consists of Chapters III, IV, V and VI, which form a detailed study of the location factors the metal industries gave for deciding to locate in Edmonton and initiating the rapid growth. Chapter III is a general analysis of these factors, discussing those that enterprises rank the most important. The remaining chapters on market, power and labour, and raw materials and transport, provide a more detailed study. The growth and expansion of markets is analyzed and discussed; whilst any trends in the supply of raw materials, transport facilities and perception of the availability of labour are dealt with in Chapters IV, V, and VI.

The third section comprises Chapter VII, a study of the evolution of the intra-urban pattern of location of the metal industries from 1910 to 1969. The final section, Chapter VIII, presents the conclusions of the study and provides suggestions for further research and discusses the limitations of the present study.

CHAPTER II

THE GROWTH OF THE EDMONTON METAL INDUSTRIES

The Early Growth of Edmonton

While the main function of Edmonton has always been that of a service and administrative centre for Northern and Central Alberta, this primary function has been augmented by a sizeable manufacturing complex in recent decades. In 1961 the manufacturing sector employed 13.3 percent of the total city labour force (Census of Canada, 1961).

The first settlement in the Edmonton district can be traced back to 1795 when the Hudson's Bay Company established a trading post at Fort Saskatchewan to serve the Prairie fur trade. By 1820 the settlement of Fort Edmonton had been established on the north side of the North Saskatchewan River occupying the site on which the Legislative Building stands today (Lee, 1963, pp. 15-16). Already in 1820 some manufacturing existed in the settlement. This was mainly blacksmithing and carpentry, which served the inhabitants of the Fort and the Canadian North-west. In the 1880's Edmonton experienced a minor growth boom; one of the industries that developed was coal mining. In 1882 six mines were in operation on McDougall Hill (Wonders, 1959, p. 12).

The boom in the 1880s was promoted by news of the proposed construction of the Canadian Pacific Railway. The original route was to pass through Edmonton on its way to

British Columbia via the Yellowhead Pass. However, the brief economic boom passed with the C.P.R. taking the southern route.

The Growth of Edmonton from 1890 to 1914

In 1891 a branch of the Canadian Pacific main line was constructed from Calgary to Edmonton. This terminated south of the North Saskatchewan in Strathcona. Meat-packing plants and tanneries were established on land surrounding the new railway yards, with brickworks and a brewery sited in the river valley. However, the presence of the railway did not give Strathcona any long-run advantage over Edmonton. The Edmonton Town Council recognized the need for an industrial base if the community was to continue its growth. A campaign was approved offering inducements to industry (Dale, 1969, p. 22). Strathcona's position was further undermined by Edmonton having a better situation as the service centre for Northern and Central Alberta (Dale, 1969, p. 2).

In 1905 the Canadian Northern Railway reached Edmonton from the north-east, providing the transportation basis for the development of the stockyards in that sector of the city. A further encouragement to the growth of Edmonton was its choice as the Provincial Capital in 1906.

In 1910 City Council appointed an Industrial Commission to devise schemes for encouraging, establishing and retaining manufacturing (Dale, 1969, p. 33). Council adopted the committee's recommendations in 1911 and purchased 245 acres of land for industrial development. This land was

located in the Inglewood District, along 124th Street, between 107th Avenue and 108th Avenue, Beechmount, in the north-east corner of the Industrial Airport, and Speedway, along 51st Avenue and the Calgary Trail. To induce industry various incentives were offered. These included tax exemptions, land for sale at nominal prices and free utilities up to a certain amount (Dale, 1969, p. 30). This programme resulted in the establishment of several flour mills and machine shops (Dale, 1969, p. 42).

In 1913 the Provincial Government passed a statute prohibiting these forms of inducement, but by then Edmonton had a firmly established industrial base and had assumed the role as the distribution centre for the North (Dale, 1969, p. 43). The majority of manufacturing firms fell into two categories. The meat-packing and the flour-milling industries supplied national and international markets by way of the transcontinental railways. The metal fabricating, brickworks and printing industries served local and regional markets (Lee, 1963, pp. 22-23). In 1911 the metal industries employed only 1.5 percent of the city's labour force and 10.6 percent of those engaged in manufacturing (Table I). The main metal industries were blacksmith shops, totalling nineteen, foundries and machine shops (Henderson's, 1910). These industries were oriented to local markets, the markets being the underlying reason for their location in Edmonton (Sutherland, pers. comm., 1970).

TABLE I

THE NUMBERS EMPLOYED IN THE EDMONTON METAL INDUSTRIES FROM 1911 TO 1961 AS PERCENTAGES OF THE TOTAL LABOUR FORCE AND TOTAL MANUFACTURING FORCE

YEAR	1 Total Labour Force	2 Total Manufacturing Force	3 Numbers Employed in Metal Industries	4 Percentage of Total Labour Force 3/1	5 Percentage of Total Manufacturing Force 3/2
1911	11,483	1,621	173	1.5	10.6
1921	21,731	2,517	440	2.0	17.4
1931	31,788	3,894	914	2.9	23.4
1941	35,242	5,271	1,441[a]	4.1	27.8
1951	67,711	10,061	1,441	2.1	14.3
1961	112,781	15,005	2,536	2.2	16.8

[a]Does not include the aircraft industry which was included in the Iron and Steel category for 1941 for the first and only occasion.

Note: The numbers employed in the metal industries are not strictly comparable due to changes in the classification of industry in the period 1911 to 1961.

Source: Census of Canada

Growth from 1918 to 1929

During this period the industrial growth of the city was composed mainly of employment increases in the manufacturing sector which had been established by World War I. The economic growth did not result in any basic alterations to the structure of the urban economy. The manufacturing industries, with the exception of meat-packing, still served only the local and immediate regional markets.

Although overall growth of manufacturing was slow, the metal industries did expand. In 1921 they employed 2.0 percent of Edmonton's total labour force and the percentage share of the manufacturing force increased to 17.4 percent (Table I). The internal structure of the metal industries remained essentially the same as in the pre-1914 era. The main sector of growth was in the number of sheet metal shops, though there was also an increase in the number of machine shops (Henderson's, 1920).

The markets of Edmonton and the surrounding region were the main cause of this growth (Buker, pers. comm., 1970). It was still possible, for firms which so wished, to locate in the present downtown area without experiencing today's congestion and lack of space. The present central area, delineated by the C.N.R. yards to the north, 97th Street to the east, the river to the south and Groat Ravine to the west, was still surrounded by open country in the 1920's. One firm relocated and moved further into the present central area. At that time the site had room for expansion, being described

as in the "bush" (Smith, pers. comm., 1970).

The Effect of the Depression

The Depression in the early 1930s resulted in a retardation of Edmonton's growth. From 1931 to 1941 the city population rose from 79,197 to 93,817 (Fig. 1). This compared unfavourably with the increase of 20,376 in the ten years from 1921 to 1931. Manufacturing growth continued to be slow, though the position of the meat-packing industry was enhanced by the location in Edmonton of Canada Packers Limited in 1935.

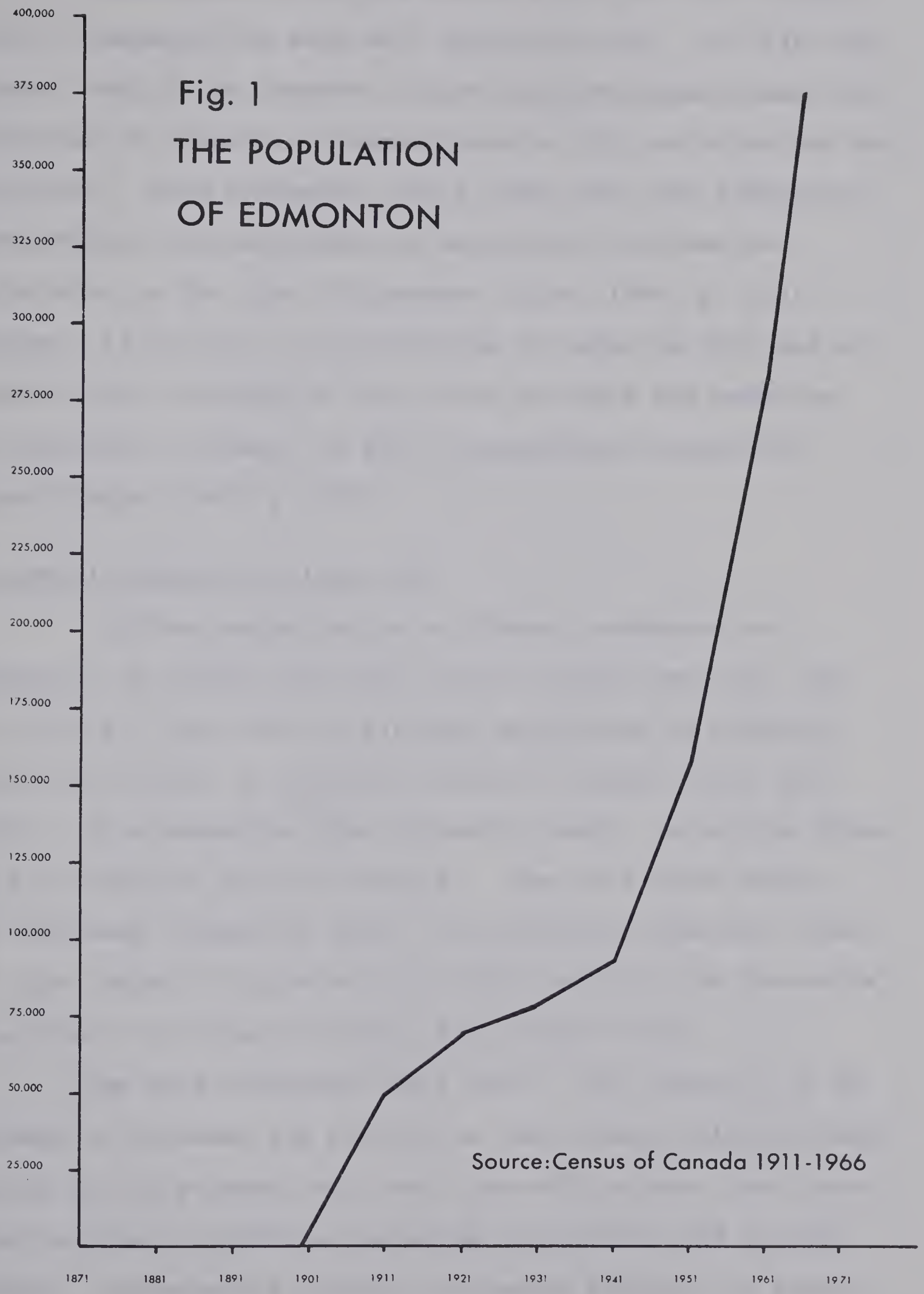
The general retardation of manufacturing growth was reflected in the metal industries. They still employed under three percent of the total labour force and formed only 23.4 percent of the total number in manufacturing. The main reasons for entrepreneurs locating in Edmonton in this period were the presence of local markets and Edmonton's position as a central place (McQuatt, pers. comm., 1970). However, the 1930s saw the slowest rate of increase in the twentieth century of this group of industries in the manufacturing sector.

Growth from 1940 to 1947

By 1940 the metal industries appear to have increased their importance in the manufacturing structure of the city. The total numbers employed had risen from 914 in 1931 to 1,474 in 1941, forming 27.8 percent of the manufacturing force (Table I).

Fig. 1

THE POPULATION OF EDMONTON

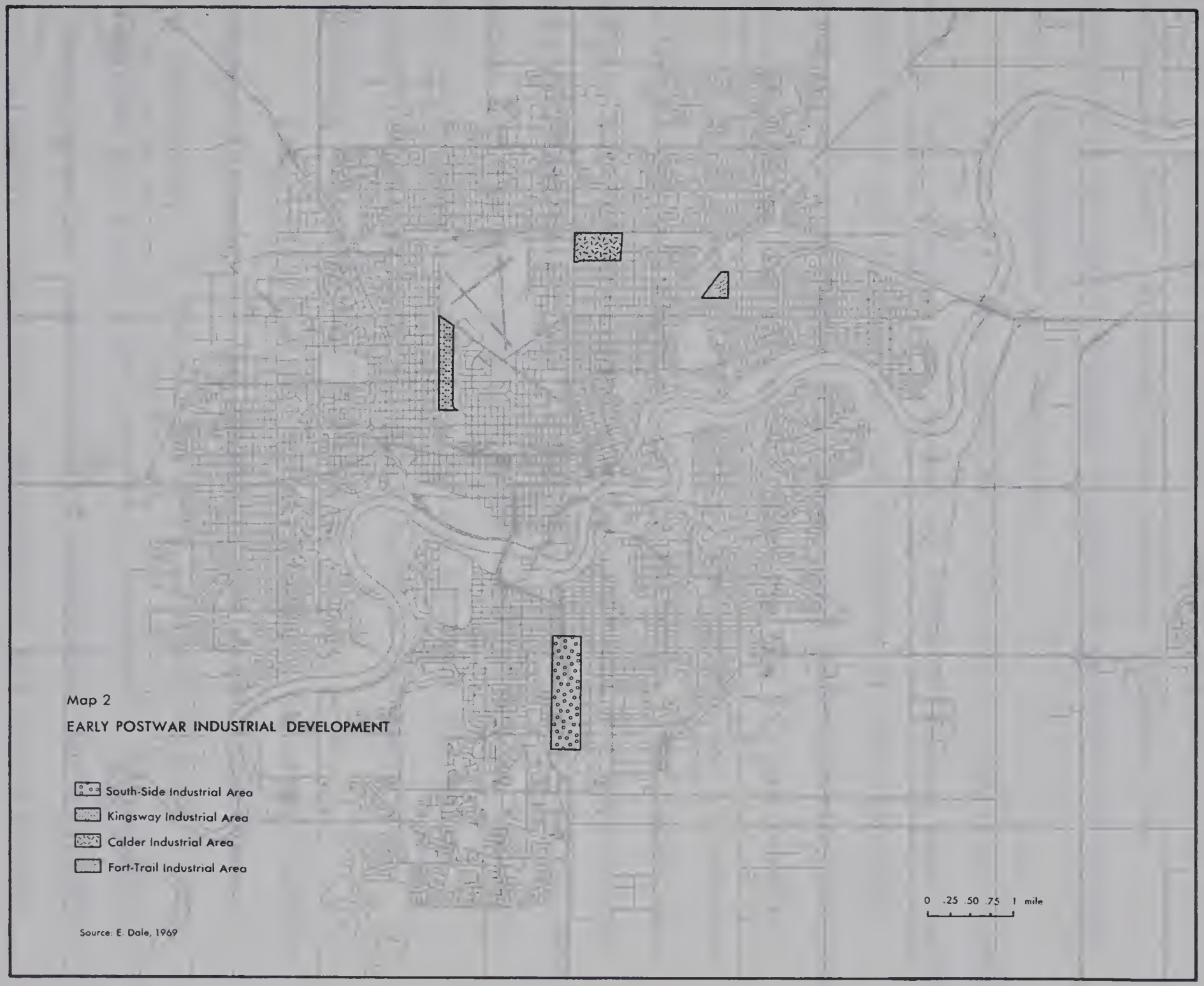


Immediately after the Second World War the attraction of industry was seen as a difficult task. In 1946 City Council set up the Edmonton Industrial Development Board and appointed an Industrial Commissioner to try and alleviate the situation. From September 1946 to July 1947 the Industrial Commissioner was successful in attracting eighteen new industries to the City of Edmonton (Dale, 1969, p. 500). However, it was the oil discoveries at Leduc in 1947 and at Redwater and Woodbend in 1948 which provided the momentum for Edmonton to enter "an era of accelerated industrial growth"(Dale, 1969, p. 500).

The Metal Industries Since 1947

Further exploitation of mineral resources and expansion of markets saw this initial growth continue into the 1950's. From 1951 to 1961 the population of Edmonton rose from 159,631 to 376,925 (Census of Canada, 1951 and 1961). To accommodate this economic growth, industrial sites were provided by the city (Map 2). The main areas being (1) Kingsway Industrial Area; (2) Southside Industrial Area; (3) The Industrial Area at Fort Trail; and (4) The Industrial Area from 97th Street to the C.N.R. Calder Yards.

The boom continued until 1960. City Council, in an attempt to increase its profits on land sales, tried to bring prices for city-owned land into line with private land costs. This resulted in pushing the price of private land up even higher. Consequently industry by-passed Edmonton in favour of Calgary. In Calgary, land prices ranged from $6,750 per


Map 2
EARLY POSTWAR INDUSTRIAL DEVELOPMENT
South-Side Industrial Area
Kingsway Industrial Area
Calder Industrial Area
Fort-Trail Industrial Area
Source: E. Dale, 1969
0 .25 .50 .75 1 mile

acre to $8,500 per acre compared to those in Edmonton which ranged between $9,700 and $21,350 per acre (Dale, 1969, p. 511). Realizing its mistake, Council reduced prices on industrial land. Although this decision enhanced the position of the city relative to that of Calgary the initial pace of development had slackened.

After 1947 the structure of the metal industries underwent a basic change. The number of firms increased more rapidly than in any previous period, as reflected by the sample of sixty-five firms (Table II). This rapid growth during the past two decades was due in large measure to the oil discoveries.

In the early 1950s part of the growth was in response to the direct influence of the oil industry. The number of Oilwell Drilling Contractors and Geophysical and Exploration Drilling Contractors was at its peak (Table III). In the same period the largest number of firms serving the oil industry were established, classified by the Standard Industrial Classification (S.I.C.) as Miscellaneous Machinery and Equipment Manufacturers (Table IV).

After 1960 the oil industry appears to have a largely indirect influence on the growth of the metal industries. The development of the oil industry is credited with having initiated the rapid urban growth of Edmonton. Consequently, a demand grew for construction of commercial, institutional and residential buildings. Subsequently the construction industry expanded and was served by sectors of the metal industries, classified by S.I.C. as the Ornamental and

TABLE II

THE DISTRIBUTION OF THE SAMPLE FIRMS

BY AGE GROUP

AGE GROUP	NUMBER OF FIRMS
1910 - 1919	2
1920 - 1929	4
1930 - 1939	3
1940 - 1949	4
1950 - 1954	9
1955 - 1959	15
1960 - 1964	16
1965 - 1969	12
TOTAL	65

Source: Field Data

TABLE III

THE NUMBER OF FIRMS IN A GIVEN YEAR ENGAGED

IN THE OIL INDUSTRY, 1950 - 1969

INDUSTRY	1950	1954	1959	1964	1969
Geophysical and Exploration Drilling Contractors	32	33	32	15	8
Oilwell Drilling Contractors	21	36	26	20	15

Source: G. H. Zieber, 1970.

TABLE IV

THE SECTORS OF THE METAL INDUSTRIES HAVING THE GREATEST TOTAL OF NEW ESTABLISHMENTS BETWEEN 1940-1969

INDUSTRY	1940 to 1949	1950 to 1954	1955 to 1959	1960 to 1964	1965 to 1969
Miscellaneous Machinery and Equipment Manufacturers	3	1	3	2	1
Metal Stamping, Pressing and Coating Industries	0	1	1	5	6
Ornamental and Architectural Fabricating Industries	0	1	1	3	1

Source: Field Data

Architectural Fabricating Industry and Metal Stamping, Pressing and Coating Industry. It is these sectors that have been the fastest growing in the past decade (Table IV).

With Edmonton becoming a major centre on the Prairies, many establishments in the metal industries have expanded their markets. No longer were local markets the main consumers. Markets have expanded to include the rest of Western Canada along with an increasing number of sales in Eastern Canada.

The Present Economic Functions of Edmonton

Despite rapid post-war growth of manufacturing, Edmonton remains predominantly a service centre. Three recent studies emphasise this dominance by the tertiary sector. Maxwell (1963) examined the urban role of the larger Canadian cities. The study utilised the "minimum" requirements approach of Ullman and Dacey (1960) which calculates the "excess" city employment producing goods for export.

Maxwell classified Edmonton as a city on the Western periphery that fell in Class II. Such a classification meant Edmonton lay outside the "economic heartland" of Southern Ontario and though manufacturing was predominant it accounted for less than 50 percent of total excess employment. A qualifier attached to the definition of Class II is that cities so classified are normally transport or service centres.

Sherbaniuk (1957) completed the first urban economic base study of Edmonton using the "macrocosmic" approach. This

technique was chosen as it allows a detailed study of individual cities. Employment again is used as the criteria for economic activity. The advantages of using employment figures are that they are readily available and give a reasonably accurate guide to the economic activity of a city. Sherbaniuk's results for 1951 show Edmonton was a major service centre and in terms of employment manufacturing only ranked fourth.

Anderson (1967) studied the economic structure for 1961 using the same technique as Sherbaniuk. In the previous decade Edmonton had grown by 90 percent and its labour force by 82 percent. However, Anderson's results showed no great increase in the basic employment in manufacturing. The manufacturing employment between 1951 and 1961 remained largely "non-basic." The greatest increase occurred in the service sector (Anderson, 1967, p. 7).

These studies reveal Edmonton's dominant function as a service centre. However, the metal industries have shown some degree of expansion. It is no longer a "non-basic" type of industry but has expanded the extent of its spatial markets.

Edmonton and Regional Economic Growth

The growth of Edmonton and the metal industries reflect North's (1955) theory of regional economic growth for North America. North claimed that the exportable commodities which formed the export base of a city or region need not necessarily be the products of primary industry. They

can be products of secondary or tertiary industry (North, 1955, pp. 244-245). Further, there is no necessary need for industrialization to sustain the growth of the region. As long as the export base keeps expanding or new exportable commodities are added, then the region will continue its economic growth.

If the export base is reliant upon products of the tertiary sector some industrialization is not precluded. One of the types of industry which develops is "residentiary" or "central place" manufacturing. These industries cater to local markets and are dependent upon the demand of the region and the fate of the export base. In time these residentiary industries may grow until they become export industries (North, 1955, pp. 246-253).

The growth of Edmonton can be seen in the context of this framework. Originally the export base consisted of services of the tertiary sector. Any manufacturing was purely of the residentiary type, with the exception of the meat-packing and flour-milling industries. The development of the oil industry stimulated the growth of manufacturing.

The metal industries are an example of this form of development. Initially they were residentiary in nature serving local markets. With the growth of the oil industry the metal industries expanded. Of a 30 percent sample of the 216 firms listed in the metal industries (City of Edmonton, 1970) only nine were established prior to 1939, whilst from 1950 to 1969 fifty-two began operations in Edmonton. At first

the markets for these firms were predominantly in Edmonton. However, over time, the importance of the immediate local market has declined, to be replaced by markets in the rest of Alberta and Canada, an indication of the transition of the metal industries from a "residentiary" type to one producing exportable commodities.

CHAPTER III

THE REASONS FOR LOCATING IN EDMONTON

Introduction

The factors considered in the industrial location decision have been discussed in the Introduction. Firms may attempt to locate at their optimal locations having considered all economic factors, i.e., attempting to maximise profits (Tiebout, 1957, p. 74). However, the entrepreneurs' knowledge of the economic environment is imperfect. The location, instead of being the actual optimal location, only approximates to it as near as the entrepreneurs' knowledge allows.

Alchian (1950) persues the concept that through uncertainty and imperfect knowledge industry will, in extreme cases, locate in a random manner. In such situations firms will be "adopted" by the economic environment if they fit into the prevailing economic conditions. Tiebout (1957) theorizes that industry "adapts" to the economic environment as a result of entrepreneurs' imperfect knowledge and uncertainty (Tiebout, 1957, p. 74). In fact, the actual process of location may be a combination of "adoption" and "adaptation." That imperfect knowledge and uncertainty influence the location decision may be seen in instances where entrepreneurs admit to the influence of the personal element and do not consider certain location factors in their decisions.

Ellis (1949) described the importance of the personal

element in the location decisions of small, new firms in New England. Conversely in decisions relating to branch plants, the parent companies display a greater awareness of the economic environment and attempt to find the optimal location. Consequently, branch plants locate as close to the optimal location as possible though imperfect knowledge and uncertainty may lead to some degree of "adaptation." The influence of the personal element on the location decision of small enterprises may be attributed to the social environments of small entrepreneurs.

Small entrepreneurs may find the incentive for establishing a manufacturing enterprise in the existence of a local market. These entrepreneurs may be aware of the potential markets in other areas, but imperfect knowledge of these economic environments leads to uncertainty. Consequently, entrepreneurs will tend to locate within the familiar environment of their home towns, a decision influenced by the personal element. This greater awareness of the economic environment in a familiar region will lead to entrepreneurs "adapting" to serve the local market although it may be that another region would offer greater opportunities. Only if entrepreneurs succeed in "adapting" to the vagaries of the local economic environment will they, in turn, be "adopted" by it. Therefore, the location decision of small firms is apparently a mixture of "adaptation" and adoption."

Uncertainty and Imperfect Knowledge in the Metal Industries

The Edmonton metal industries reflect the combination of "adaptation" and "adoption" in their location decisions.

Entrepreneurs were asked two questions regarding their decision to locate in Edmonton (Appendix B). One question was open-ended and allowed the entrepreneurs to state the main factor accounting for their presence in Edmonton. The second question asked entrepreneurs to rank, in descending order of importance, seven location factors that could have influenced their location decision. In many instances only two or three factors would be ranked. In the case of large enterprises this showed an awareness of the economic environment as the firms stated the remaining factors were of equal importance and influence. With smaller firms, however, entrepreneurs said only the ranked factors were of any importance at all. The remaining factors were not even considered in the location decision, an example of imperfect knowledge.

Further evidence of imperfect knowledge and uncertainty is that 19.3 percent of the sample were inconsistent in their responses to the two questions. For example, one firm in answering the open question gave personal reasons for its Edmonton location, yet the two factors it indicated as being the most influential in its location decision were labour and site considerations. Another entrepreneur also gave the personal element as the reason for his location, but ranked market and the availability of materials in the other question. The responses agreed with the findings of Ellis (1949) in New England of the personal element playing an important role in the location of small, new enterprises. Of

the thirteen firms that began operations in Edmonton between 1910 and 1949 only five (38.4 percent) mentioned the personal element in answer to either of the two questions. In comparison, thirty-four of the remaining fifty-two enterprises (65.3 percent) mentioned the personal element. Further substantiation of Ellis' (1949) findings is that when manufacturing commenced, the average employment size of firms mentioning the personal element was only five. The average size of enterprises which did not mention the personal element was nineteen employees. These results show that there is a greater likelihood of the personal element influencing the location decision of newer and younger establishments. This trend provides evidence of the uncertainty and imperfect knowledge that exists in the metal industries.

Factors Influencing Location in Edmonton

It must not be misunderstood from the above discussion that the personal element is the only factor which influences location in Edmonton. The reason given most often for the establishment of a plant in the city was the potential market to be found in Western Canada (Table V).

Thirty-six enterprises ranked the availability of market as the most important factor, and twenty-four ranked it second. The personal element was the overall second most important factor being ranked first by twenty-seven manufacturers (Table V). No other location factor was mentioned as being the most important more than once.

TABLE V

THE FACTORS OF LOCATION RANKED IN ORDER OF IMPORTANCE BY THE FIRMS INTERVIEWED

LOCATION FACTOR	ORDER OF IMPORTANCE						
	1	2	3	4	5	6	7
Market	36	24	1	0	0	0	0
Personal Element	27	24	1	0	1	0	1
Site	1	11	12	10	1	3	1
Materials	0	2	12	3	6	2	1
Labour	1	4	6	8	1	2	0
Transport	0	5	6	4	2	4	1
Power	0	1	4	5	7	4	3

Source: Field Data

If the results of Table V are weighted, by values ranging from seven to one, the overall importance of the market and personal element becomes even more evident (Table VI). The advantage of weighting these factors is that the importance enterprises attach to the availability of site is revealed. When using unweighted values this importance of site is partially concealed. Further, the small range covering materials, labour, transport and power confirms the attitude of entrepreneurs of these factors having little influence in the decision to locate a plant in Edmonton. This attitude towards materials, labour, transport and power lends further evidence to the argument that uncertainty and imperfect knowledge exists within the metal industries for it shows the lack of consideration entrepreneurs give to these factors. The existence of this attitude may be attributed to the entrepreneurs' acceptance of the unfavourable position in which they find themselves. Materials have to be transported great distances and a skilled labour force is not readily available. These are obvious disadvantages to which entrepreneurs appear willing to accept and adjust.

Market and the Personal Element

The dominant importance of market potential and the personal element is confirmed by the responses to the open question. In this instance the personal element is taken as existing when Edmonton is the home town of the entrepreneur. Thirty-eight entrepreneurs in response to the open question stated they had located in Edmonton because of the potential

TABLE VI

THE WEIGHTED RANKING OF THE FACTORS OF LOCATION

LOCATION FACTOR	Total Weighted Ranking
Market	401
Personal Element	263
Site	183
Materials	107
Labour	98
Transport	91
Power	78

Source: Field Data

market. Eighteen stated that their location was a result of the personal factor. The remaining nine entrepreneurs gave other reasons for their location in Edmonton which will be examined later.

Accepting the personal element as being restricted to where Edmonton is the home town of the entrepreneur, the eighteen responses did not account for all the entrepreneurs in the metal industries whose home town is Edmonton. There were four such entrepreneurs who stated that the potential market was the main attraction of a city location, evidenced by the fact that all had considered other possible sites before establishing their operations in Edmonton. These other locations included British Columbia, Saskatchewan and Calgary. Conversely, five entrepreneurs from other cities had all been attracted by the market potential of Edmonton though again they had considered the possibilities of other cities as the site for their operations.

It is interesting to note that none of the branch plants interviewed had been influenced in their location decision by the personal element. It was the market in Western Canada which was the greatest influence in their location decision. Eleven of the thirteen branch plants stressed the importance of potential market, the remainder stating they were in Edmonton for other economic reasons.

In certain instances some of the ten firms which gave other reasons for their Edmonton location could have been classified as having located due to market potential and

the personal element. That they were not is because they did not specifically mention the potential market or did not give the fact that Edmonton was the home town of the entrepreneur.

Two enterprises were the subsidiaries of older Edmonton companies. The subsidiaries had been established in order that the parent companies might broaden their range of products. Two branch plants had respectively located in Edmonton because of the parent companies'desire for a plant in Western Canada and spin-off from the plant in Winnipeg. These four plants had all located in Edmonton as a result of the market potential but their responses did not specifically mention this potential.

The location of two enterprises could be said to have been influenced by the personal element though in both cases Edmonton was not the home town of the entrepreneur. The first plant was established because of the desire of the Eastern family which owned the parent company for a plant in Edmonton. This desire took twenty-seven years to satisfy. The other firm was established by an entrepreneur who had previously been a partner in another Edmonton company. A disagreement with the partners had led the entrepreneur to resign and subsequently establish his own manufacturing operation. The presence of one enterprise in Edmonton, manufacturing equipment for the oil industry, was the result of unique circumstances. Originally the company had been British owned but the parent company had withdrawn its backing;

consequently the Edmonton employees took over the company and maintained production.

Conclusion

The metal industries in Edmonton are located in the city due to the potential market and the personal choice of entrepreneurs. The market potential of Western Canada is a factor that has played an important part in the location of these enterprises in the city. The important role of the personal element offers proof of the uncertainty and imperfect knowledge that exists amongst entrepreneurs. Consequently entrepreneurs locate in the city because of the greater security they feel exists in a familiar environment. That other factors are not considered important may be due to the imperfect knowledge of entrepreneurs. Being far removed from sources of materials and with no abundant supply of skilled labour the metal industries are at somewhat of a disadvantage. However, that many of the firms state they are satisfied with their location suggests that they do not think an Edmonton location is a disadvantage.

That the metal industries are at a relative disadvantage compared to Eastern Canada lends strength to the theory of "adaptation" and "adoption." Small firms, especially those located due to the personal factor, would seem to have been "adopted" by the economic environment. Their "adoption" can be attributed to the prevailing economic environment creating a demand for their products. Larger firms and branch plants are examples of "adaptation." Being

more aware of the economic environment they still decided to locate in Edmonton as it offered certain advantages and consequently "adapted" to this local economic environment.

That the industry has survived and grown, especially since 1950, may be attributed to the market potential of Western Canada which overcomes the disadvantages of skilled labour being insufficient and distance from materials sources. Unfortunately, it is impossible to obtain figures for firms which have failed in the metal industries, but it is certainly more feasible to suggest that the metal industries in Edmonton have located through a combination of "adaptation" and "adoption" rather than because of the entrepreneurs' desire to seek the optimal location.

CHAPTER IV

MARKET

Introduction

The study of markets served by the metal industries in Edmonton is divided into three parts. Firstly, the historical evolution of markets is considered to provide insight into the changing pattern of spatial markets through time. Directly related to this is the second objective which is to present a general analysis of the main areas presently served by the metal industries. Finally, a study is made of the markets of the various industries within the whole group in order to provide a detailed look at both the types and spatial extent of markets. For example, this analysis reveals which sectors are oriented towards local markets and which are serving markets further afield.

Each firm that was interviewed was asked to give the percentage of its products that were marketed in the following areas: Edmonton, the rest of Alberta, Western Canada (excluding Alberta), Eastern Canada, and other (being taken as foreign markets) for the year that the firm first began operations and for 1969. In asking for the percentage markets in each of these years it was hoped to determine firstly, to what extent Edmonton was the primary market in the first year of operations and secondly, to determine whether through time

the relative importance of the original markets had declined whilst markets in other areas had risen in prominence.

Method of Analysis

To facilitate the analysis of the growth and importance of markets served by the metal industries the sixty-five firm sample was divided into eight categories according to the period in which the firm was established. The firms had begun operations over a period of fifty-nine years from 1910 to 1969. In the period from 1910 to 1949 only fourteen firms had begun operations in Edmonton; therefore, this period was broadly divided into four ten-year categories. The remaining firms all began manufacturing after 1949 and establishments were assigned to one of four five-year categories up to 1969. The results of the distribution of firms by age groups are shown in Table II.

For each category, the percentage markets for the five areas were calculated for the period in which firms began operations and for 1969. This was achieved by weighting the percentage markets of the five regions for individual enterprises by the numbers employed at the time. Then the overall percentage markets of the regions were calculated for each age category.

In the study of the spatial extent of markets of the various sectors of the metal industries the same method was utilized. However, instead of firms being assigned by age categories they were grouped according to the Standard Industrial Classification (S.I.C.). One problem in using

such a method is that firms in any sector may not have begun operations in the same period of time. Therefore, the original markets of these firms are not truly comparable. However, the data for the year in which firms began manufacturing is included as it gives a general picture of the market distribution of firms in each sector when manufacturing began. Conversely the aggregate percentages for 1969 give a true indication of the distribution of current markets for the various industries.

Growth and the Present Spatial Pattern of Markets

The results of the analysis of markets by age groups are shown in Table VII and Table VIII. They show an overall trend of the metal industries to expand their markets. In the initial year of operations the main markets were Edmonton and the rest of Alberta. In five temporal categories over 50 percent of the original sale of products occurred in Edmonton. Three of these categories were of firms which located in Edmonton after 1950, suggesting that the potential markets of a rapidly developing Edmonton were an important factor in the establishment of the firms (Table VIII).

Of the remaining categories, firms starting manufacturing between 1910 - 1919 and 1930 - 1939 had over 50 percent of their original markets in Alberta and 40 percent plus in Edmonton. The 1930 - 1939 category also sold a small proportion of its products in the other provinces of Western Canada (Table VII). These results reveal the important role that the local markets of Edmonton and Alberta had in the

TABLE VII

THE PERCENTAGE DISTRIBUTION OF MARKETS BY AGE GROUPS IN THE PERIODS MANUFACTURING BEGAN AND 1969 FOR FIRMS WHICH BEGAN BETWEEN 1910 - 1949

MARKET REGION	1910-1919		1920-1929		1930-1939		1940-1949	
	a[1]	b	a	b	a	b	a	b
Edmonton	45.4	29.8	92.2	50.9	41.0	38.5	78.3	86.1
Rest of Alberta	54.6	56.2	7.6	39.1	53.5	51.5	16.2	36.1
Western Canada[2]	-	14.0	0.1	10.0	5.5	10.0	5.5	20.8
Eastern Canada	-	-	-	-	-	-	-	7.0
Other	-	-	-	-	-	-	-	-

[1] a - Year firms began operations.
b - 1969.

[2] Excluding Alberta.

Source: Field Data

TABLE VIII

THE PERCENTAGE DISTRIBUTION OF MARKETS BY AGE GROUPS IN THE PERIODS MANUFACTURING BEGAN AND 1969 FOR FIRMS WHICH BEGAN BETWEEN 1950-1969

MARKET REGION	1950-1954		1955-1959		1960-1964		1965-1969	
	a[1]	b	a	b	a	b	a	b
Edmonton	62.8	43.1	31.7	48.5	66.0	48.9	66.9	37.1
Rest of Alberta	34.8	39.7	58.4	32.2	27.4	40.5	33.1	53.0
Western Canada[2]	2.2	13.1	5.5	11.7	6.6	10.4	-	9.4
Eastern Canada	0.1	2.6	0.9	5.1	-	0.1	-	0.5
Other	-	1.4	3.3	2.3	-	1.3	-	-

[1] a - Year firms began operations.
b - 1969

[2] Excluding Alberta.

Source: Field Data

early years of the metal industries. The potential market of pre-war Edmonton, partially protected by distance acting as a barrier, was an incentive for many enterprises to begin production (Edmonton, 1963, p. 191). The growth of Edmonton after the 1947 oil discoveries influenced the establishment of firms satisfying the demands of the oil industry in particular, and the growing market for metal products in general.

The percentage markets of the metal industries in 1969 show the diminished importance of the Edmonton market and the increased prominence of those in more distant regions. The two main regions where markets have increased are the rest of Alberta and Western Canada. In four age categories the market in the rest of the Province has shown a substantial increase (Table VII and Table VIII). For example, the share of the provincial market for the 1920 - 1929 category has increased from 7.6 percent to 39.1 percent; for the 1960 - 1965 category from 27.4 percent to 40.5 percent and for the 1940 - 1949 category from 16.2 percent to 36.1 percent. Two of the remaining categories have also shown an increase in the Provincial market though of a much smaller order.

The Western Canadian market has been a prominent area of growth for products of the metal industries and it appears that in the future it will continue to expand as Edmonton grows in prominence as a regional service and manufacturing centre. Eastern Canada is also beginning to appear as an important secondary market: improved communications have

allowed firms in certain specialised fields to enter into competition with the Eastern Canada manufacturing belt. However, because of advantages of geographical concentration and economies of scale in the eastern manufacturing belt it would appear Eastern Canada is unlikely to become a primary market of the Edmonton metal industries. Further growth has also occurred in foreign markets, but foreign competitors and the distance factor would appear to be disadvantages for any major expansion of these markets.

The trends reflected by establishments which began operations between 1955 - 1959 seem opposed to the overall pattern of market growth. The figures show the increasing importance of the Western and Eastern Canadian markets (Table VIII). However, there appears to be an increase in the Edmonton market in 1969 from 31.7 percent to 48.5 percent. This is due to the unique growth of one firm, Servco of Canada Limited, which produces drilling equipment. In 1955 the firm's markets were 50 percent in Alberta and 50 percent in Western Canada. By 1969 Servco of Canada Limited, employing five people, had experienced a change in its market structure. Its market distribution was now 35 percent in Edmonton, 35 percent in the rest of Alberta and only 30 percent in Western Canada. Such a change is reflected throughout the 1950 - 1959 category with a decline in the Provincial market and an increase in that of Edmonton.

The general picture is one of growth in the more distant markets of the metal industries. However, it is only

a limited proportion of the firms that have expanded the spatial extent of their markets. Numerous establishments have retained the same breakdown of markets in 1969 as they had in the year they began operations (Table IX).

Twenty-seven firms have retained their original market pattern. Most firms have done so while increasing their labour force and output. For example, one firm has increased the number it employs from 10 to 170 workers and another from 12 to 97. One significant feature is the number of firms in each age category that have retained the same market pattern. The time factor is clearly seen as being an important factor in the expansion of markets. It appears the longer a firm has been in production the greater the likelihood of it expanding the spatial extent of its markets (Table IX). In the two oldest age categories, all enterprises have expanded their markets. From 1930 on the percentage of firms which have the same distribution of markets increases. This culminates in the 1960 - 1969 category where 58.3 percent of the firms have retained their original market pattern.

The Markets for the Different Sectors of the Metal Industries

Studying the markets for various sectors within the diverse metals group reveals those oriented toward local markets and those oriented to more distant markets. Of the twelve S.I.C. categories, which represent the firms in the metal industries, five are oriented to local markets with over 60 percent of the market in Edmonton in 1969 (Table X). The industries oriented strongly to Edmonton include Iron

TABLE IX

NUMBER OF FIRMS IN EACH AGE GROUP WHOSE PERCENTAGE DISTRIBUTION HAS REMAINED THE SAME

AGE GROUP	TOTAL NUMBER OF FIRMS	NUMBER OF FIRMS WHOSE MARKET DISTRIBUTION HAS REMAINED THE SAME	PERCENTAGE OF FIRMS WHOSE MARKET DISTRIBUTION HAS REMAINED THE SAME
1910-1919	2	0	-
1920-1929	4	0	-
1930-1939	3	1	33
1940-1949	4	1	25
1950-1954	9	4	44.4
1955-1959	15	6	40
1960-1964	16	7	43.7
1965-1969	12	7	58.3
TOTAL	65	27	41.5

Source: Field Data

TABLE X

PERCENTAGE DISTRIBUTION OF MARKETS FOR THE

S.I.C. CATEGORIES ORIENTED TO LOCAL MARKETS

INDUSTRIAL GROUP	EDMONTON		REST OF ALBERTA		WESTERN CANADA[1]		EASTERN CANADA		OTHER	
	a[2]	b	a	b	a	b	a	b	a	b
Iron Foundries	100	70	-	20	-	5	-	-	-	-
Wire and Wire Product Manufacturers	100	66	-	28.6	-	5.3	-	-	-	-
Metal Rolling, Coating and Extruding Industries	77.7	68.4	16.5	10.4	5.5	21.1	-	-	-	-
Ornamental and Architectural Metal Fabricating Industry	74.1	61.3	20.1	26.8	5.7	11.7	-	-	-	-
Fabricated Structural Metal Industry	68.5	63.8	24.8	26.9	2.4	8.4	-	0.6	-	-

[1]Excluding Alberta

[2]a-year firms began operations
b-1969

Source: Field Data

Foundries, Metal Rolling, Casting and Extruding firms, the Fabricated Structural Metal Industry and the Wire and Wire Product Manufacturers. These industries have expanded their markets to some degree, but it is significant none have any foreign markets and only the Fabricated Structural Metal Industry has a market in Eastern Canada. However, this forms only 0.6 percent of the total sales (Table X).

Seven groups are oriented to markets further afield (Table XI). These include: Iron and Steel Mills, Boiler and Plate Works, and Miscellaneous Metal Fabricating Industries, which all have less than 25 percent of their market in Edmonton. Their main market is in the rest of Alberta having 78.1 percent, 61.5 percent and 61.6 percent respectively, of their markets in the Province.

The Metal Stamping, Pressing and Coating Industry and Machine Shops have under 60 percent of their market in Edmonton, but the local market remains the area with the highest percentage of sales. The second most important market is the rest of the Province, but these two categories have a greater spatial extent to their markets than those more oriented to Edmonton (Table XI).

As discussed previously, the time span that may exist between the years of establishment of various firms in an industrial category means a comparison of original market distributions can only be of a general nature. However, it does provide some indication of the growth of markets and shows that firms presently oriented to distant markets were

TABLE XI

PERCENTAGE DISTRIBUTION OF MARKETS FOR THE

S.I.C. CATEGORIES ORIENTED TO DISTANT MARKETS

INDUSTRIAL GROUP	EDMONTON		REST OF ALBERTA		WESTERN CANADA[1]		EASTERN CANADA		OTHER	
	a[2]	b	a	b	a	b	a	b	a	b
Metal Stamping, Pressing and Coating Industries	84.1	57.9	8.2	22.3	3.7	10.8	2.9	6.1	0.6	2.9
Miscellaneous Metal Fabricating Industries	80	21.2	10	61.6	10	16	-	0.6	-	1.3
Machine Shops	78.5	53.8	16.4	23.2	5.1	13.7	-	5.6	-	3.7
Boiler and Plate Works	76.3	24.8	13.4	61.5	-	13.5	-	-	-	-
Steel Pipe and Tube Mills	65.8	47.9	32.7	49.2	1.3	9.4	-	-	-	-
Miscellaneous Machinery and Equipment Manufacturers	44	37.4	49.7	46.4	5.8	12.1	0.5	4.1	-	-
Iron and Steel Mills	8.1	12.9	82.3	78.1	4.8	4.4	-	-	4.8	4.4

[1]Excluding Alberta
[2]a-year firms began operations
b-1969

Source: Field Data

originally oriented to the Edmonton market. In fact, all industrial categories, with the exception of Iron and Steel Mills, had over 60 percent of their original market in Edmonton.

Conclusion

Although a large number of firms have their market in Edmonton, industrial linkages do not appear to be highly developed amongst the metal industries. The apparent lack of linkages can be accounted for by the type of products manufactured by the industries. Over 80 percent of the sample stated that their products were final. Consequently these were sold to the general public or other firms outside the metal industries for installation. These firms are engaged in the oil and construction industries. The five firms that stated their products were non-final found their markets amongst sheet metal and machine shops, these markets not necessarily being confined to Edmonton. West-Steel Roscoe Limited stated the markets for their unfinished products were in Alberta, Western Canada, the North West Territories and the Yukon; the same pattern as Norwood Foundries Limited (Buker, pers. comm., 1970).

The results of the analysis show that over a period of time the extent of the markets served by the metal industries has increased and that the older the firm the more likely is this to have occurred. For the majority of enterprises Edmonton was originally the prime market, the potential playing an important role in influencing the metal industries

to locate in the city. However the expansion of these industries, associated with the development of the oil industry and rapid growth of the city, led to the increased importance of the Provincial and Western Canadian markets. This saw a relative decline in the importance of the Edmonton market.

CHAPTER V

TRANSPORT AND RAW MATERIALS

Introduction

Raw materials have played an important role historically in the location of the primary iron and steel industry. However the importance of accessibility to raw materials has been superceded by proximity to market in the location of both the primary and secondary iron and steel industry (Estall and Buchanan, 1961, p. 27). The secondary iron and steel industries of the types existant in Edmonton do not show a tendency to locate near their source of materials. Transport costs on semi-processed materials may be relatively high though transport costs on finished products are even higher. Hence for lighter types of metal industries the existence of a market or availability of good transport facilities exercises greater influence on the choice of location than materials (Stamp and Beaver, 1963, p. 393).

Since the Edmonton metal industries are a form of secondary manufacturing the lack of a local source of materials has not apparently hindered the growth of these industries. This is accounted for by the existence of Western Canada's potential market and good transportation facilities. However, the presence of a good transportation network was not cited as an important factor by the metal firms in their decision to locate in Edmonton (Table V, p. 32).

Transportation

That transportation should not be listed as an important factor can possibly be attributed to the presence of good, overland transport facilities before the majority of the metal industries began operation. Edmonton and other leading western communities were served by the Canadian Pacific Railway and the Canadian National Railway by the beginning of the twentieth century. Despite the advantage of the railway system, the vast distances involved and high freight costs on finished goods offered some protection from the competition of older manufacturing centres in Eastern Canada.

No manufacturer stated that transportation was the major factor in the decision to locate in Edmonton. Only five entrepreneurs ranked transportation as the second most important factor. This attitude towards transportation strengthens the argument of Alchian (1950) of firms being "adopted" by the economic environment. Many firms take the availability of transport for granted, though its existence undoubtedly aids many firms to survive in the economic environment.

Recent Trends in Transportation

Since 1945 Canada has experienced the development of long distance trucking operations. These operations have offered serious competition to railroad freight services. This development has been associated with the improvement and construction of major highways. In the case of Edmonton this has culminated in the opening of the Yellowhead Route

which puts "new, major urban, industrial and market concentrations on a direct route to the coast or indeed to the East" (Edmonton, 1970). Substantial advantages accrue to manufacturers from the development of such routes for trucking offers a more rapid and efficient service than rail.

The materials used in the Edmonton metal industries are obtained from distant sources. There has been an increased use of trucking for movement of materials, even from the most distant points. This trend reflects the advantages mentioned above.

Manufacturers who obtain their materials from local suppliers all use road transportation, whether it is their own vehicles or a public transportation company. Of greater interest are firms who obtain their materials from further afield and are utilising trucking facilities to an increasing extent (Table XII). It might have been expected that over long distances railroads would have been the most commonly used transportation system. However, this does not prove to be so. Of firms reliant solely on Eastern Canadian sources of raw materials only two utilize railroads alone. Four firms utilize only trucking facilities whilst the rest use a combination of both. No firm drawing upon material sources in the United States is solely reliant upon railroads. Seven firms use only trucking facilities and four a combination of road and rail. This reveals the increasing importance of trucking operations in the Edmonton metal industries.

TABLE XII

THE DIFFERENT MODES OF TRANSPORTATION USED IN THE TRANSPORTING OF MATERIALS

SOURCE OF MATERIALS	MODE OF TRANSPORTATION		
	ROAD	RAIL	ROAD & RAIL
Local	15	-	-
Eastern Canada	4	2	6
Eastern and Western Canada	6	-	12
Canada and the United States	7	-	4

Source: Field Data

As a means of conveying raw materials air transportation has been little utilized. This situation is explained by the bulk nature of materials for the metal industries and the high weight relative to value of the materials. These characteristics prohibit the use of aircraft for the movement of materials. Only two firms have utilized this form of transportation; in each case the materials are small, light and of high cost. Christensen Diamond Limited use air transport for the delivery of diamonds mined in South Africa. The Alco Machine Company Limited flies in bearings from Sweden. Despite these firms having utilized air transportation, it would seem unlikely that other manufacturers in the metal industries would turn to this form of freight movement.

Materials

With a broad spectrum of industries classified as metal industries it is no surprise that the materials needed vary greatly. By far the most common material is steel in various forms. These include sheet steel, structural steel and stainless steel. Iron in the form of black iron, galvanised iron and carbon iron is another material widely utilised. Other materials used in substantial amounts in the metal industries include aluminum, wire in various forms and welding rod. The sector manufacturing products for the construction industry utilizes non-metalic materials such as timber and glass. For the firm Christensen Diamond Limited diamonds are an essential material in the production of drill

bits for the oil industry.

Not all materials are in the semi-processed state. Some are components such as ball bearings, machinery parts and pipe. These materials are utilized by firms producing machinery. The main materials of the electro-plating industry are the non-ferrous metals, namely chrome, copper, bronze, nickel and brass. Few, if any, of these materials are produced in Alberta and are consequently obtained from all over the North American Continent as well as abroad.

Sources of Materials

Fourteen firms stated that their sources of materials was local. However, due to the absence of these in their natural state in the Province, it is possible to assume the materials are supplied by local suppiers. These suppliers import the materials from outside the Province. Apart from these firms the majority obtain materials from other various sources.

The manufacturing belt in Ontario is the major source of materials for the Edmonton metal industries. A wide variety of materials are supplied, including steel products, non-ferrous metals, tin-plate and glass. The supply of glass is of particular interest. It is used by firms who serve the construction industry and originally was imported from Japan and Belgium. However in recent years it has been obtained from Eastern Canada since the development of a glass industry at Owen Sound, Ontario.

The other major source of raw materials has been the

United States. The materials originating from the south are similar to those obtained from Eastern Canada. Certain materials are purchased in the United States due to their unavailability in Canada. An interesting case which can be mentioned is that of the Cameron Ironworks of Canada Limited. Its raw materials are obtained from the parent company in Houston, Texas and the branch plant in Livingstone, Scotland. Originally, the firm had tried Eastern Canada as a source of materials but it had proved to be unsatisfactory.

Though nowhere near as important suppliers as Eastern Canada and the United States foreign sources play a significant role as suppliers of raw materials. These sources include Europe, Great Britain and Japan. Europe and Great Britain supply materials in the form of customised products not available in North America or are kept on as suppliers through inertia. The growth of Japan as a supplier of the metal industries is in keeping with the overall development of the iron and steel industry of that country. With low labour costs, efficient integrated iron and steel works and the ability to produce a ton of steel at just over half the cost in the United States the Japanese industry has grown into a major world producer. This, coupled with an efficient transport system, allows the Japanese industry to supply the Edmonton metal industries at competitive prices through the port of Vancouver (Warren, pers. comm., 1969).

Conclusion on Materials

With raw materials drawn from such scattered sources

no definite pattern emerges, though certain tendencies can be discerned. The first is that only two manufacturers reliant upon local suppliers employ more than forty people. Ten firms employ less than ten people. Another trend concerns the supply of materials for branch plants. Of the fifteen plants interviewed, six have always been supplied by the parent company (Table XIII). Four of these are located in the United States. The one feature that distinguishes these two groups of branch plants is the size of their labour forces. Though branch plants tend to have larger work forces than the average firm in the metal industries the group reliant upon the parent company for materials have smaller labour forces than the branch plants that are not (Table XIII and Table XIV). It is interesting to note the remaining two branch plants originally obtained their materials from the parent company in the United States. Subsequently, one now obtains its materials from Eastern Canada and the other from Pittsburgh, Calgary and Japan.

The third tendency has been toward firms purchasing materials over a wider area (Tables XV, XVI, XVII and XVIII). There has been a decrease in the number of establishments obtaining their materials locally and an increase in the number turning to Eastern Canada for materials. Surprisingly there has been a fall in the number of firms solely reliant upon the United States whilst there has been an increase of manufacturers drawing upon both Canada and the United States for materials. This trend reflects the growth of the Edmonton

TABLE XIII

THE LOCATION OF PARENT COMPANIES THAT SUPPLY THE EDMONTON BRANCH PLANTS WITH MATERIALS

LOCATION OF PARENT COMPANY	NUMBER OF EMPLOYEES
Eastern Canada	17
Houston, Texas	20
Tulsa, Oklahoma	20
Middleton, Ohio	20
Salt Lake City, Utah	40
Eastern Canada	135

Source: Field Data

TABLE XIV

BRANCH PLANTS IN EDMONTON AND THE LOCATION OF THE PARENT COMPANY WHERE THE SOURCE OF MATERIALS DIFFERS

LOCATION OF PARENT COMPANY	SOURCE OF MATERIALS	NUMBERS EMPLOYED
Winnipeg	Europe, Eastern Canada	8
Vancouver	United States, Eastern Canada	15
Vancouver	Eastern Canada	30
Toronto	Edmonton, Kimberley, B.C.	40
Tulsa, Oklahoma	Edmonton	50
Montreal	Eastern Canada, United States	97
Germany	Eastern Canada, Japan, Great Britain, Australia	140

Source: Field Data

TABLE XV

SOURCE OF MATERIALS IN THE PERIODS IN WHICH FIRMS BEGAN OPERATIONS, 1910-1949

SOURCE OF MATERIALS	1910 to 1919	1920 to 1929	1930 to 1939	1940 to 1949	TOTAL
Edmonton	1	1	-	2	4
Eastern Canada	1	-	1	-	2
Western Canada	-	-	-	-	0
Edmonton, Eastern Canada	-	1	-	-	1
Edmonton, Western Canada	-	-	1	-	1
United States	-	-	1	1	2
Canada and United States	-	-	-	-	0
Foreign Sources	-	2	-	1	3

Source: Field Data

TABLE XVI

SOURCES OF MATERIAL IN THE PERIOD IN WHICH FIRMS BEGAN OPERATIONS, 1950-1969

SOURCE OF MATERIALS	1950-1954	1955-1959	1960-1964	1965-1969	TOTAL
Edmonton	5	1	5	5	16
Eastern Canada	2	2	3	2	9
Western Canada	-	-	-	-	0
Edmonton, Eastern Canada	-	2	1	-	3
Edmonton, Western Canada	1	2	2	1	6
United States	-	2	-	1	3
Canada, United States	-	2	2	1	5
Foreign Sources	1	4	3	2	10

Source: Field Data

TABLE XVII

SOURCES OF MATERIAL IN 1969 FOR FIRMS

BEGINNING OPERATIONS IN PERIOD 1910-1949

SOURCE OF MATERIALS	1910-1919	1920-1929	1930-1939	1940-1949	TOTAL
Edmonton	1	1	-	1	3
Eastern Canada	1	1	2	-	4
Western Canada	-	-	-	-	0
Edmonton, Eastern Canada	-	1	1	-	2
Edmonton, Western Canada	-	-	-	-	0
United States	-	-	-	-	0
Canada, United States	-	-	-	-	0
Foreign Sources	-	1	-	3	4

Source: Field Data

TABLE XVIII

SOURCES OF MATERIALS IN 1969 FOR FIRMS

WHICH BEGAN OPERATIONS IN PERIOD 1950-1969

SOURCE OF MATERIALS	1950-1954	1955-1959	1960-1964	1965-1969	TOTAL
Edmonton	3	2	3	5	13
Eastern Canada	3	1	4	2	10
Western Canada	-	1	-	-	1
Edmonton, Eastern Canada	1	3	1	-	5
Edmonton, Western Canada	2	2	3	1	8
United States	-	-	-	-	0
Canada, United States	-	3	3	2	8
Foreign Sources	-	3	2	2	7

Source: Field Data

metal industries. Local suppliers can no longer meet all the demand and establishments find it necessary to obtain materials directly from their source.

CHAPTER VI

POWER AND LABOUR

Introduction

Power and labour as factors of production have had little influence upon the establishment of firms in the Edmonton metal industries. As power is readily available in all communities in the form of electricity or gas, entrepreneurs do not consider it an important location factor. Many of the firms interviewed stated that power would be of no consideration in the location decision regardless of where they located in Alberta. The majority of firms also stated that labour factors would not be a primary consideration in the decision to locate in Edmonton (Table V, p.32). Despite the apparent unimportance of these factors the attitude of entrepreneurs in the metal industries towards them is of interest and certain trends can be discerned.

Power

Power is a pre-requisite of all industry. In Edmonton the most common supply of power for the metal industries is in the form of electricity. All the firms utilized electricity as their main source of power. Of the group interviewed, sixty firms are supplied by the city owned utility: Edmonton Power. The remaining establishments are dependent upon Calgary Power for their source of electricity. Natural

gas is the other form of energy used by the metal industries. The nine firms which utilise this form of power in their production processes are supplied by Northwestern Utilities Limited.

Only the respondent of one company stated that the availability of power influenced his location. However, when questioned later about the main factors which affected his choice of Edmonton as a location, the availability of power was not mentioned. The remaining enterprises answered in the negative when asked if the availability of power had influenced their Edmonton location. This may be due to the average cost of power forming only 2.5 percent of the value added by manufacturing for the whole of the metal industries (Dominion Bureau of Statistics, 1965). The unimportance of power was confirmed when the firms were asked to rank the factors of location as they had influenced the location decision. Only twenty-five firms ranked power at all, with only one firm ranking it as important (Table V). This firm ranked it the second most important factor after the availability of market. For the rest power was only ranked fourth, fifth or sixth in importance.

Labour

Only four firms ranked labour as an important consideration in their decision to locate in Edmonton. One enterprise, Porta-Test Limited, stated that labour was the most important factor in the location decision (Willis, pers. comm., 1970). The other three enterprises all ranked labour

as the second most important location factor (Table V). Despite this apparent unimportance of labour the average labour costs for the metal industries form 36.2 percent of the value added by manufacture (Dominion Bureau of Statistics, 1965).

Regarding the supply of skilled labour the consensus is that supply is insufficient for the needs of the metal industries, but that the other advantages offered by Edmonton overcome this handicap. Despite the unimportance attached to the availability of skilled labour, the attitudes and demands for skilled labour by the metal industries provide an interesting field of study. Such a study can attempt to trace any trends that have developed in the amount of skilled labour which is available.

Forty-two of the firms interviewed stated that they regarded themselves as needing a high percentage of skilled labour on their labour forces. This was taken as being that 50 percent of the labour force was skilled. For the purposes of analysing the attitude of entrepreneurs to the availability of skilled labour, the firms were grouped according to the S.I.C. This method of classification revealed the sectors of the metal industries which needed the largest amounts of skilled labour (Table XIX). The firms with the greatest need for a high percentage of skilled labour are engaged in the Metal Stamping, Pressing and Coating Industry, Machine Shops and Miscellaneous Metal Fabricating Industries. Manufacturers with little need for a high percentage of skilled labour are

TABLE XIX

NUMBER OF FIRMS THAT NEED SKILLED

LABOUR CLASSIFIED BY THE S.I.C.

S.I.C.	NUMBER NEEDING HIGH PERCENTAGE OF SKILLED LABOUR	NUMBER NOT NEEDING HIGH PERCENTAGE OF SKILLED LABOUR
Iron and Steel Mills	1	1
Steel Pipe and Tube Mills	1	5
Iron Foundries	1	0
Metal Rollings, Castings and Extrusion Manufacturers	1	1
Boiler and Plate Works	1	1
Fabricated Structural Metal Industry	2	1
Ornamental and Architectural Metal Industry	5	3
Metal Stamping, Pressing and Coating Industry	10	5
Wire and Wire Product Manufacturing	2	0
Hardware, Tool and Cutlery Manufacturing	3	2
Machine Shops	7	0
Miscellaneous Metal Fabricating Industries	3	0
Miscellaneous Machinery and Equipment Manufacturers	5	4

Source: Field Data

those engaged in the heavier metal industries, i.e., Steel Pipe and Tube Mills and Iron and Steel Mills.

In analysing the general labour situation and availability of skilled labour only those enterprises needing a high percentage of skilled labour were studied. The breakdown of these establishments and their perception of the availability of labour for the year manufacturing began and 1969 is shown in Table XX. Originally the majority of manufacturers, 52.7 percent, believed there was an insufficient supply of skilled labour. By 1969 only 50 percent believed the supply was insufficient. This slight decrease might suggest that the demand for skilled labour is increasingly being met from cities' labour pools, though in 1969 there was still an insufficient supply to meet all the demands of the metal industries.

To understand the attitude of entrepreneurs towards the demand and supply of skilled labour further study is required. This includes examination of the training programmes firms operate at present or have operated in the past (Table XXI). Four firms which originally found the supply of skilled labour insufficent, but who now believe the situation remedied have abandoned their training programmes. Conversely, of the six firms who stated that sufficient skilled labour was available at the time they began operations but insufficient in 1969, three have introduced some sort of training programme. The largest group of enterprises, those stating that the supply of skilled labour has always fallen behind demand, have

TABLE XX

THE ATTITUDE OF FIRMS NEEDING A HIGH PERCENTAGE

OF SKILLED LABOUR TO THE SUPPLY OF SKILLED LABOUR

THE LABOUR SITUATION	NUMBER OF FIRMS	PERCENTAGE OF FIRMS
Firms That Stated Sufficient Skilled Labour Available When Production Commenced	20	47.3
Firms That Stated Insufficient Skilled Labour Available When Production Commenced	22	52.7
Firms That State Sufficient Skilled Labour Available in 1969	21	50.0
Firms That State Insufficient Skilled Labour Available in 1969	21	50.0

Source: Field Data

TABLE XXI

FIRMS OPERATING OR THAT HAVE

OPERATED TRAINING PROGRAMMES

TRAINING PROGRAMMES	A[1]	B	C	D
Training When Commenced Production and in 1969	6	3	3	13
No Training When Commenced Production but training in 1969	4	3	-	2
No Training at all	4	-	-	-
Training When Commenced Production but no Training in 1969	-	-	4	-

[1]A - Firms stating sufficient skilled labour has always been available.

B - Firms stating sufficient skilled labour available when commenced production but insufficient in 1969.

C - Firms stating insufficient skilled labour available when commenced production but sufficient in 1969.

D - Firms stating there has always been insufficient skilled labour available.

Source: Field Data

nearly all offered training programmes since they began operations in Edmonton. The firm Cameron Ironworks of Canada Limited provides a unique case study. Originally the firm's labour force was imported from the United States due to the lack of skilled labour being available in Edmonton (Nourse, pers. comm., 1970). Another manufacturer blames the lack of suitable institutions offering the required type of training for many firms instituting their own training programmes.

Further analysis showed that the largest deficiency in the availability of skilled labour is experienced by the Ornamental and Architectural Metal Industry, Metal Stamping, Pressing and Coating Industry, Wire and Wire Product Manufacturers and Machine Shops. It is these above sectors which have experienced the greatest growth rate, in terms of new establishments, since 1950 (Tables XXII, XXIII and XXIV). These tables respectively show the periods in which manufacturing began and the number of firms which claim a shortage of skilled labour.

This pattern can be explained mainly in terms of the rapid development of Edmonton. Prior to 1939 there was a limited market for the products of these industries (Tables XXII and XXIII). The rapid growth of Edmonton, development of the oil industry and the introduction of new products saw an increase in demand. Manufacturers attracted by the potential market offered by Edmonton established plants. The attraction of the market overcame the disadvantage of an unskilled labour force. This situation is revealed even more

TABLE XXII

DISTRIBUTION OF FIRMS BY S.I.C. WHICH STATE THEY NEED A LARGE PERCENTAGE OF SKILLED LABOUR AND THE PERIOD IN WHICH THEY BEGAN PRODUCTION, 1910-1949

S.I.C.	1910-1919	1920-1929	1930-1939	1940-1949
Iron and Steel Mills	-	-	-	-
Steel Pipe and Tube Mills	-	1	-	-
Iron Foundries	-	-	-	-
Metal Rolling, Casting and Extrusion Manufacturers	-	-	1	-
Boiler and Plate Works	1	-	1	-
Fabricated Structural Metal Industry	-	-	-	-
Ornamental and Archetectural Metal Industry	-	-	-	-
Metal Stamping, Pressing and Cooking Industry	1	1	-	-
Wire and Wire Product Manufacturers	-	-	-	-
Hardware, Tool and Cutlery Manufacturing	-	-	-	-
Machine Shops	-	1	-	1
Miscellaneous Metal Fabricating Industry	-	-	-	-
Miscellaneous Machinery and Equipment Manufacturers	-	-	-	2

Source: Field Data

TABLE XXIII

DISTRIBUTION OF FIRMS BY S.I.C. WHICH STATE THEY NEED A LARGE PERCENTAGE OF SKILLED LABOUR AND THE PERIOD IN WHICH THEY BEGAN PRODUCTION, 1950-1969

S.I.C.	1950-1954	1955-1959	1960-1964	1965-1969
Iron and Steel Mills	-	1	-	-
Steel Pipe and Tube Mills	-	-	-	-
Iron Foundries	-	-	1	-
Metal Rollings, Castings and Extrusion Manufacturing	-	-	-	-
Boiler and Plate Works	-	-	-	-
Fabricated Structural Metal Industry	-	1	-	1
Ornamental and Architectural Metal Industry	1	3	1	1
Metal Stamping, Pressing and Coating Industry	1	-	4	3
Wire and Wire Product Manufacturers	-	2	-	-
Hardware, Tool and Cutlery Manufacturing	-	1	2	-
Machine Shops	3	-	-	2
Miscellaneous Metal Fabricating Industry	-	1	2	-
Miscellaneous Machinery and Equipment Manufacturers	-	1	1	1

Source: Field Data

TABLE XXIV

DISTIBUTION OF FIRMS NEEDING A HIGH PERCENTAGE OF SKILLED LABOUR BY S.I.C. AND THEIR PERCEPTION OF THE AVAILABILITY OF SKILLED LABOUR

S.I.C.	A[1]	B	C	D
Iron and Steel Mills	-	1	-	-
Steel Pipe and Tube Mills	1	-	-	-
Iron Foundries	-	-	-	1
Metal Rollings, Castings and Extrusion Manufacturing	-	-	-	1
Boiler and Plate Works	-	1	-	-
Fabricated Structural Metal Industry	1	1	-	-
Ornamental and Architectural Metal Industry	1	1	-	3
Metal Stamping, Pressing and Coating Industry	2	1	3	4
Wire and Wire Product Manufacturers	-	-	-	2
Hardware, Tool and Cutlery Manufacturing	2	-	1	-
Machine Shops	3	-	1	3
Miscellaneous Metal Fabricating Industry	1	1	1	
Miscellaneous Machinery and Equipment Manufacturers	3	-	1	1

[1]See Table XXI for classification

Source: Field Data

clearly in Table XXV. Manufacturers, who state the supply of skilled labour fails to meet the demand in 1969, have all expanded or plan to expand in one or more of the indicies that can be taken as indicators of growth.

These indicators are increased employment, expansion of present facilities, plant relocations and associated growth of markets (Table XXV). All but one firm have larger labour forces than when they began operations. Some of these increases are by large amounts, i.e., from 1 to 80; from 10 to 65 and from 10 to 135. The labour force of the single exception has merely declined from thirty-one to thirty. However in this latter firm there has been an increase in facilities, an increase in the spatial extent of markets and a plant relocation. Of the two firms who have failed to grow, other than in numbers employed, one is planning to expand its facilities and the other is a small machine shop whose owner is uninterested in large scale development. These results suggest that although there is a shortage of skilled labour it has never been a deterrent to the growth of the metal industries.

Conclusion

As a location factor the supply of skilled labour or lack of it has not played an important role in influencing entrepreneurs to establish plants in Edmonton. Some firms believe there is sufficient skilled labour available for their needs whilst others state there is a deficiency. However, it is not a critical deficiency which has prevented

TABLE XXV

FIRMS ASSERTING THERE IS AN INSUFFICIENT SUPPLY OF SKILLED LABOUR AND THE SECTORS IN WHICH THEY HAVE EXPANDED

SECTORS IN WHICH FIRMS HAVE EXPANDED	NUMBER OF FIRMS
Relocation and Employment	4
Market and Employment	2
Expanded Facilities, Relocation and Employment	2[a]
Expanded Facilities, Market and Employment	4[a]
Market, Relocation and Employment	1
Expanded Facilities, Market and Relocation	1
Expanded in all Sectors	5
Employment only	2[a]

[a]One manufacturer planning further growth due to increased demand.

Source: Field Data

firms from expanding since it can be alleviated by training programmes for employees.

CHAPTER VII

THE INTRA-URBAN LOCATION OF THE METAL INDUSTRIES

Introduction

Relatively little has been written about the intra-urban location of industry. The intra-urban pattern of location can only be understood by examination of historical events. The complexity of these events and their impact on their spatial distribution of industry have made it difficult to develop any theoretical basis for intra-urban location (Berry and Horton, 1970, p. 459).

Various attempts have been made to explain the intra-urban location of manufacturing. Burgess (1925) conceived the idea of "concentric circles" explaining the pattern of urban development. The concept can be criticized as Burgess only delimits a zone of mixed wholesaling and "light" manufacturing adjacent to the central area. Further criticism is that the theory is too simple to explain the complexities of urban location that occur in reality. Also the intra-urban location of the metal industries in Edmonton does not substantiate the theory of "concentric circles." The two most acceptable theories on intra-urban location have been the sector theory of Hoyt (1939) and the "multiple nuclei" theory of Harris and Ullman (1945). Hoyt (1939) suggested that industrial growth followed the route patterns of railroads but criticism has been levelled at this theory. Pred (1964)

stated that although growth has followed route patterns, the industrial structure of cities is more complex than the sector theory allows (Pred, 1964, p. 172).

The "multiple nuclei" theory intimates that manufacturing is found in "light" and "heavy" manufacturing districts (Harris and Ullman, 1945). In such instances "light" manufacturing would be found in "wholesale and light industry" districts located near the Central Business District. These districts would offer good transport facilities and proximity to market (Harris and Ullman, 1945, p. 15). Two criticisms are made of "multiple nuclei" theory. The first is the division of manufacturing into "light" and "heavy" industry. No practical definition exists exists beyond "light" industry being described as small scale, non-nuisance and "heavy" industry as large scale, nuisance industries. The second criticism is that in reality no clear spatial separation exists between "light" and "heavy" industry (Pred, 1964, p. 172).

Pred (1964) hypothesized on the urban siting of industry in American cities. In a study of San Francisco, Pred concluded there were seven types of industry found within metropolitan areas, their intra-urban location being dependent upon different factors. The first two categories located on the periphery of the central area. The Ubiquitous Industries concentrated near the Central Business District are so located near to the central area as their markets are essentially coextensive with the metropolis. Food processing industries comprise the bulk of these industries. Centrally

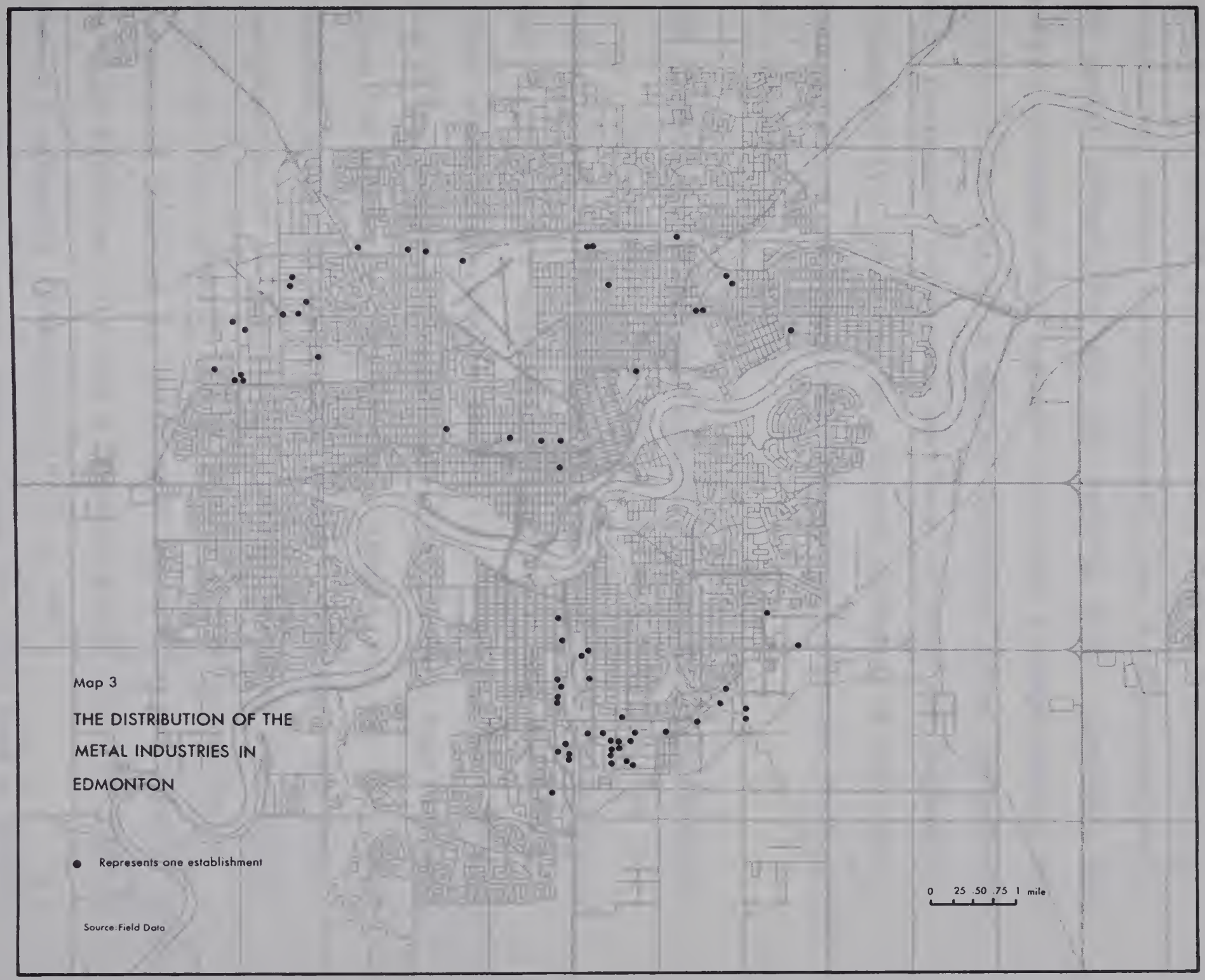
located "Communication-Economy" Industries, i.e., job-printing, are found in the central area due to a need for face-to-face contact with the consumer. Two groups of industries which tend to locate randomly are Local Market Industries and Non-Local Market Industries producing high value products. In the case of the latter transport costs play a secondary role in the total cost structure and hence location is random as transportation considerations are minimized. Non-centrally located "Communication-Economy" Industries are located in the suburbs. Being highly scientific they tend to nucleate there in order to keep abreast of the latest innovations. Non-Local Market Industries on the waterfront are so located due to transportation considerations, whilst industries oriented to national markets are most commonly found on the side of the metropolis facing toward the most important market (Pred, 1964, pp. 174-179). However, a criticism of these conclusions of the study is the sole use of San Francisco as a representative example. Despite the criticism certain of Pred's conclusions are valid. He mentions the original tendency of industry for a central location in urban areas. Such a tendency has declined in past decades. A need for more land and improved transportation facilities, plus the termination of the need for close linkages between place of work and place of residence, have all led to decentralization.

The outer fringers of the central area were originally the main sites for industrial location. Firms were in close

proximity to the local market and source of labour. As industries expanded however, the site considerations changed. A need grew for more space to accommodate the new mass production methods. Growing markets meant a need for improved transportation facilities and more land for the construction of additional facilities. As overall urban development led to the central area becoming congested and little land being available for industrial use, these needs could only be satisfied in the suburbs. The advantages of a location in outlying districts were numerous. Land prices were lower, better transportation facilities were available and there was room for expansion.

Once industry moved from the central area to the suburbs, firms engaged in the same type of manufacturing would locate in the same area of the city. Logan (1966b) noticed this in his study of Sydney. Large enterprises in need of more space would locate in undeveloped areas which offered advantages of land availability, low costs for land and low taxes. Small firms would be attracted to these suburbs by the possibilities of industrial linkages and agglomeration economies. Consequently the result was the development of manufacturing suburbs (Logan, 1966b, p. 457).

Despite objections the theories of Hoyt (1939) and Harris and Ullman (1945) have a degree of applicability in Edmonton. A definite axial pattern of location has developed on the north side of the North Saskatchewan River (Map 3). On the south side there is evidence of a "multiple nuclei"


Map 3
THE DISTRIBUTION OF THE
METAL INDUSTRIES IN
EDMONTON
● Represents one establishment
Source: Field Data
0 .25 .50 .75 1 mile

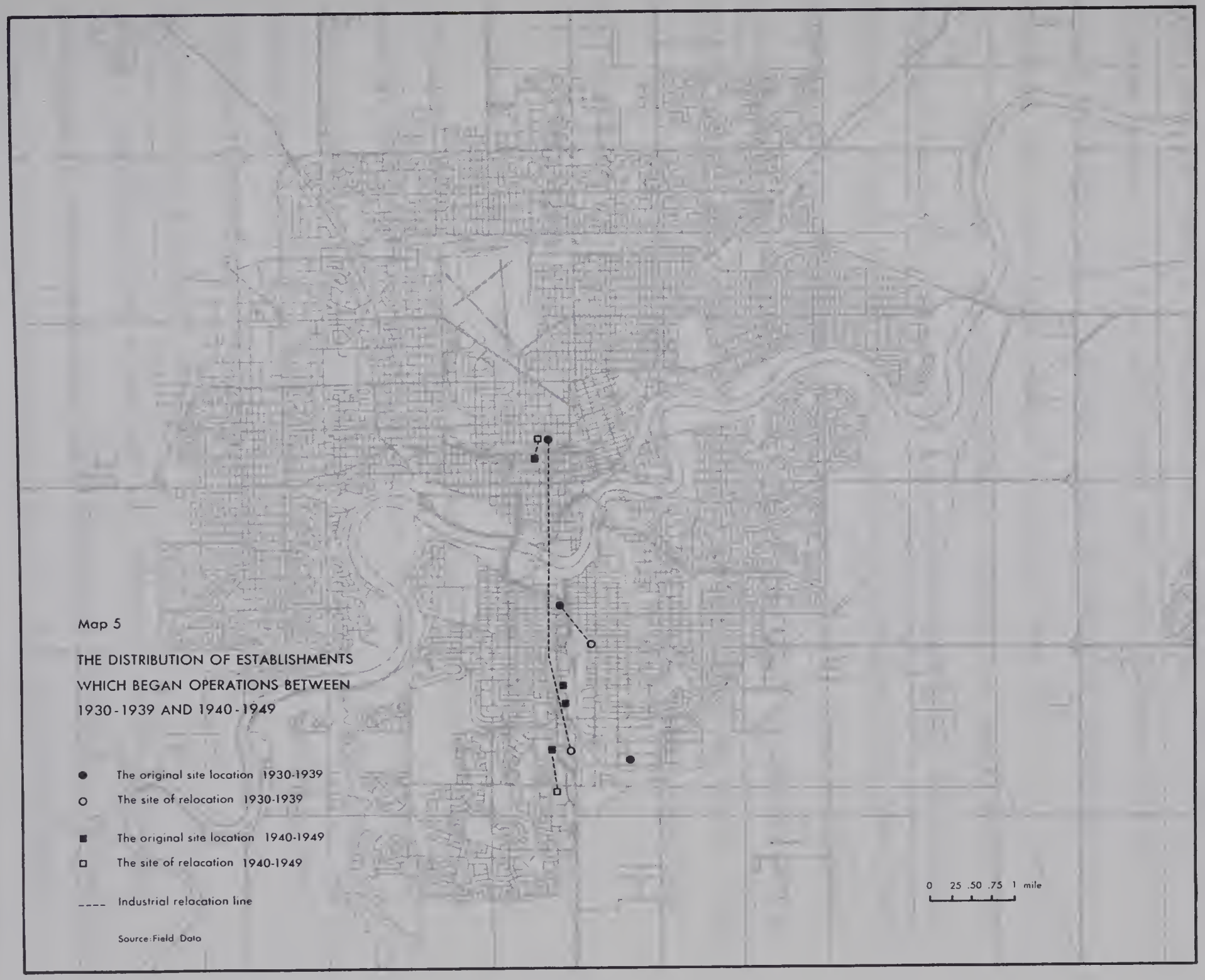
development of the metal industries' location. The causes for this pattern evolving are found in the events which shaped the growth of Edmonton as a whole. Proximity to market and labour force originally saw a concentration of the metal industries near the central area. However dispersal followed with improved railroad transportation and growth of the city. A central location became undesirable with increased land costs and lack of room for expansion. Consequently, there was an outward movement of the metal industries to outlying districts which coincided with growth of the external markets.

The Present Intra-Urban Location of the Metal Industries

The present location of the metal industries is concentrated in the north-west and south-east quadrants of the city (Map 3). The oldest area is on the south-side which shows the greatest degree of concentration. Originally the establishments located near the Canadian Pacific Railway along 104 street - Calgary Trail (Map 4 and Map 5). Such a pattern reflected axial development. However the later designation of an industrial district east of the Calgary Trail by City Council in the 1960's led to a nucleated pattern of location as propounded by Harris and Ullman (1945). In this district is found a concentration of firms serving the oil industry (Edmonton, 1967, p. 66).

The north-west sector does not show such a concentration. However, it is an industrial district which did not start to develop until the late 1950's and it is still


Map 4
THE DISTRIBUTION OF ESTABLISHMENTS
WHICH BEGAN OPERATIONS BETWEEN
1910-1919 AND 1920-1929
The originol site locotion 1910-1919
The site of relocation 1910-1919
The original site location 1920-1929
The site of relocotion 1920-1929
Industrial relocation line
Source Field Doto
0 25 .50 .75 1 mile


Map 5
THE DISTRIBUTION OF ESTABLISHMENTS
WHICH BEGAN OPERATIONS BETWEEN
1930-1939 AND 1940-1949
The original site location 1930-1939
The site of relocation 1930-1939
The original site location 1940-1949
The site of relocation 1940-1949
Industrial relocation line
Source: Field Data
0 25 .50 .75 1 mile

undergoing expansion. It differs from the industrial district in the south-east in that the establishments are generally newer and are small, single storey buildings with less storage space. It has good road and rail access, being served by eight rail sidings. The pattern of location reflects the "multiple-nuclei" concept (Map 3).

That the "multiple-nuclei" concept is applicable in Edmonton is due to the metal industries being of the "light" variety. There is no "heavy" industry found within the city limits. Only two establishments, West-Steel Roscoe Limited and Canadian Phoenix Limited, could possibly be described as "heavy industrial plants," a description based on their size. Both are located on the south-east city boundary away from any residential areas.

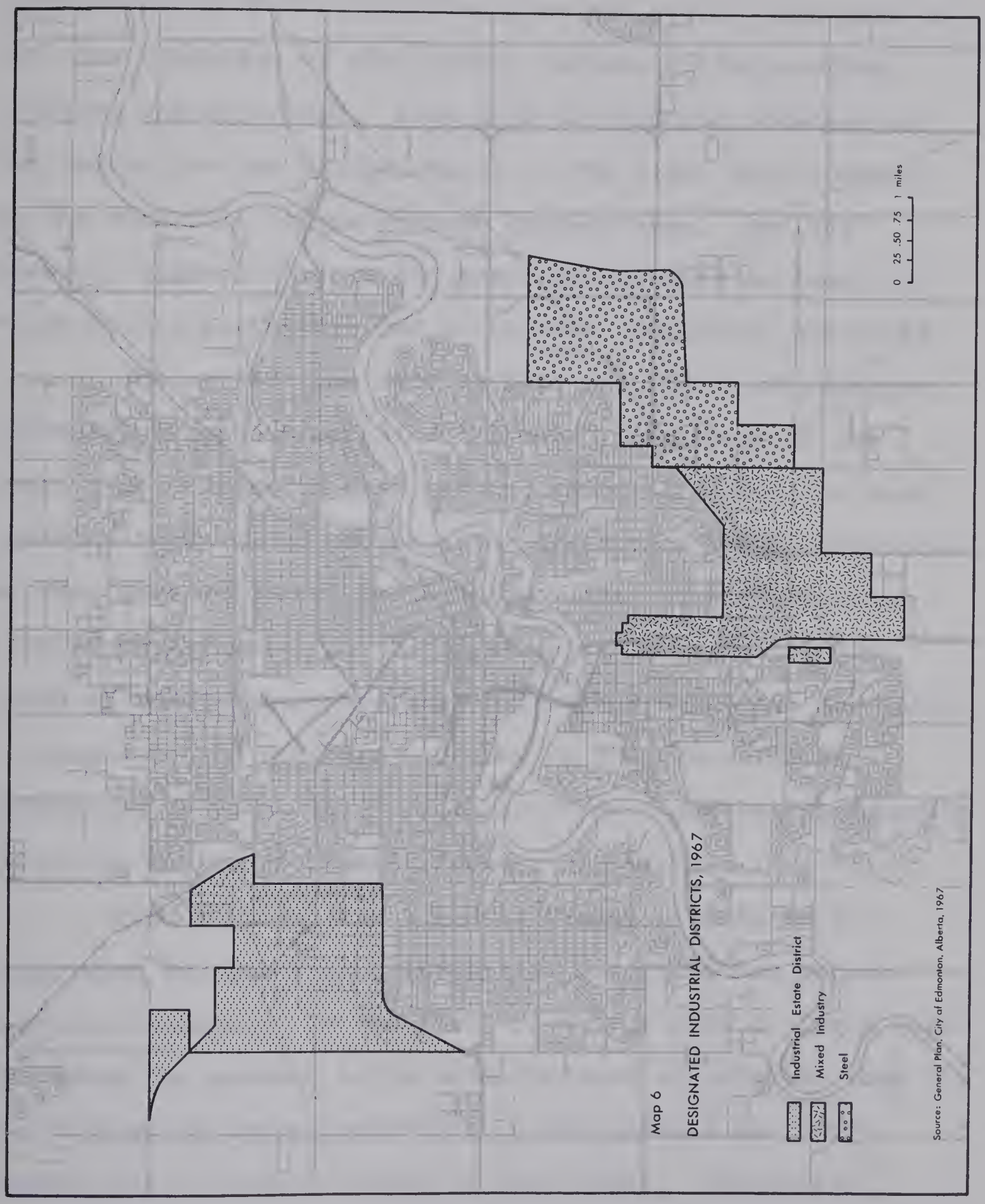
The remaining establishments would appear to have located at random. However, with but two exceptions, they are found sited on or near the Canadian National Railway's marshalling yards. The four firms in the north-east have located near the meat-packing complex, one of the oldest industrial sectors of Edmonton. These firms would appear to have located on the basis of Hoyt's (1939) axiom of growth along tansport routes.

Whether such a pattern of industrial intra-urban location is the result of city zoning is difficult to assess. Industrial zoning was first called for in 1945 with the impending post-war development of manufacturing. The zoning was based on "performance,"i.e., zones were designated

according to the type of manufacturing already located there (Edmonton, 1963, p. 199). However, before 1945 the metal industries had shown a tendency to locate in the industrial sectors where it is found at present (Map 4 and Map 5).

In 1967 the city recommended in the "General Plan" that any future expansion in Edmonton of the metal industries should occur within the designated industrial sectors. These were in the north-west, designated as Industrial Estate District, and the two areas in the south-east, designated for Mixed Industry and Steel (Edmonton, 1967). These districts approximate closely to the existing intra-urban pattern of location of the metal industries (Map 6). This may be due to the designation being based on the "industrial performance" prior to zoning of these districts.

The present policy of the City Planning Department is that any future development of the metal industries should occur within these sectors. The exact location within the district is the decision of individual firms. At present the City Planning Department can not force a firm presently established in a non-industrial district to relocate, though if the firm wishes to move it must relocate in an industrial district. It has always been policy to oppose the expansion of existing facilities of establishments in non-industrial districts. However such opposition has had little success. Manufacturers have the right to appeal and in the past such appeals have been upheld.



Map 6

DESIGNATED INDUSTRIAL DISTRICTS, 1967

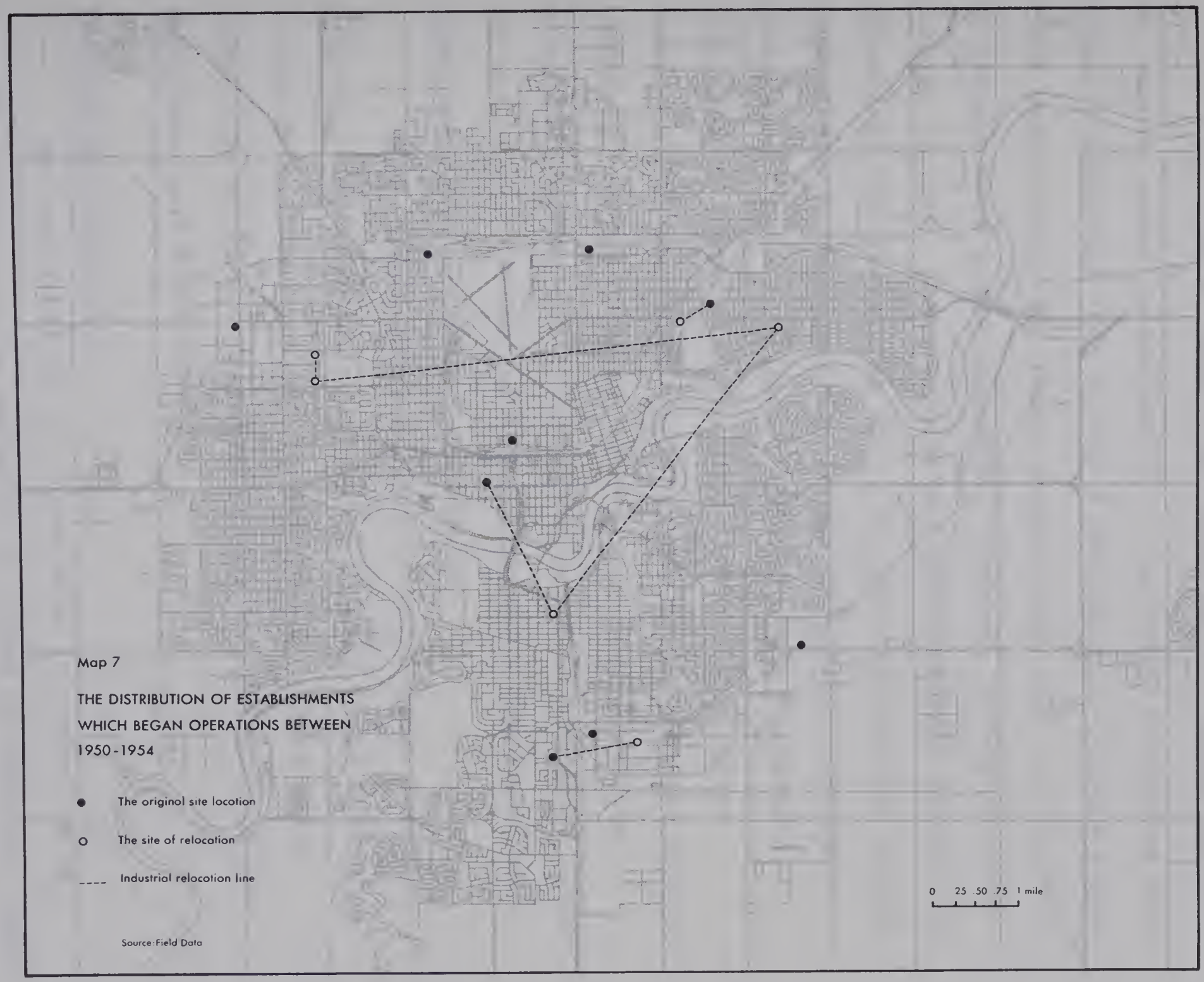
Source: General Plan, City of Edmonton, Alberta, 1967

The Development of the Pattern of Intra-Urban Location

By studying the original location of the metal industries and their relocation over the period from 1910 to 1969 the evolution of the present pattern of intra-urban location can be traced. From 1910 to 1929 the location of the industries was random (Map 4). The firms were located on the outskirts of the present central area. By 1969 however, these locations had been relinquished in favour of sites in the north-west and south-east Industrial Districts.

The period from 1930 to 1949 saw the first definite tendency of concentration of the metal industries on the south-side; the south-east was beginning to become the main location focus, four of the eight firms that began operations in this period located in the south-east. The firms which located to the north of the river chose locations to the north of the Canadian National Railway's tracks that are taken to delineate the northern boundary of the central area (Edmonton, 1967, p. 96). Of these firms one has subsequently relocated in the south-east Industrial District (Map 5).

From 1950 on the trend of firms locating in the north-west and south-east Industrial Districts has become firmly entrenched. In the first five-year period firms were following the present intra-urban pattern of location (Map 7). One firm which began operations in this period has since changed its location a total of four times. Originally located downtown, it moved to a site on the south-side. It then relocated in the north-east of Edmonton before establishing


Map 7
THE DISTRIBUTION OF ESTABLISHMENTS
WHICH BEGAN OPERATIONS BETWEEN
1950-1954
The originol site locotion
The site of relocation
Industrial relocotion line
Source:Field Data
0 25 .50 .75 1 mile

itself in the north-west Industrial District, but not until it had relocated once in this particular district (Map 7).

From 1955 to 1969 firms continued to locate in the two sectors where concentration of the metal industries has become intensified (Map 8, Map 9 and Map 10). Of the firms which began operations in the period from 1955 to 1959 over 66 percent have since relocated. However, unlike previous changes in site, these relocations have occurred within the Industrial Districts (Map 88). By 1960 the majority of new establishments were locating in the Industrial Districts designated by the city (Map 9 and Map 10). There were instances of firms starting production outside these districts, on the immediate periphery of the central area of Edmonton. By 1969 though, nearly all these firms had relocated, moving out to the outer areas of the city. These new sites were in the Industrial Districts which were also experiencing some internal relocation.

Thus, the present pattern of intra-urban location evolved. If the trend of the past fifteen years continues it can be assumed that any further growth of the metal industries would occur in the Industrial Districts of the north-west and south-east.

Reasons for Relocation

The availability of a good site is ranked as an important factor in the decision to locate in Edmonton (Table V). This may be due to the metal industries being able to easily relocate on new sites when aspects of their old

Map 8

THE DISTRIBUTION OF ESTABLISHMENTS
WHICH BEGAN OPERATIONS BETWEEN
1955-1959

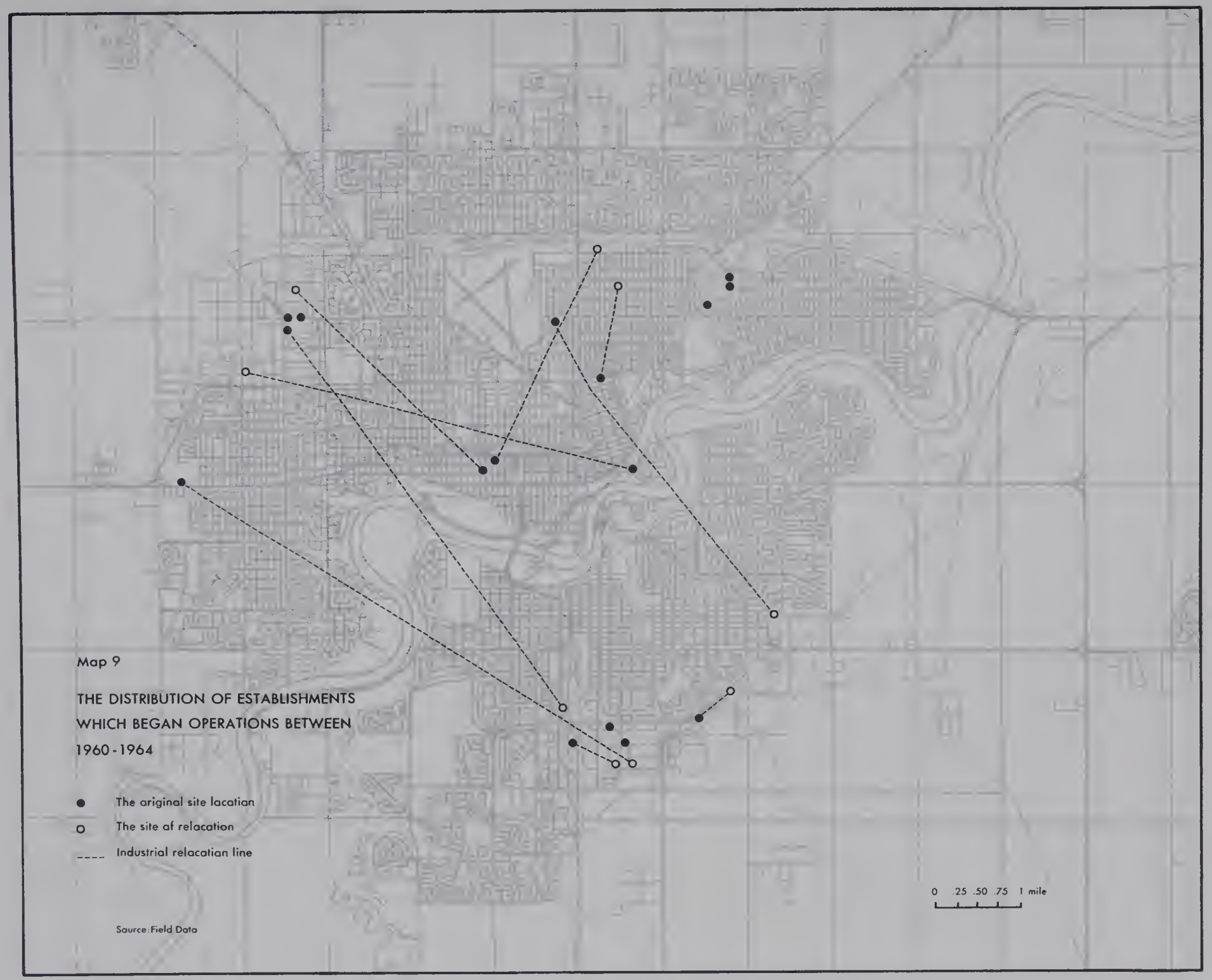
● The original site location

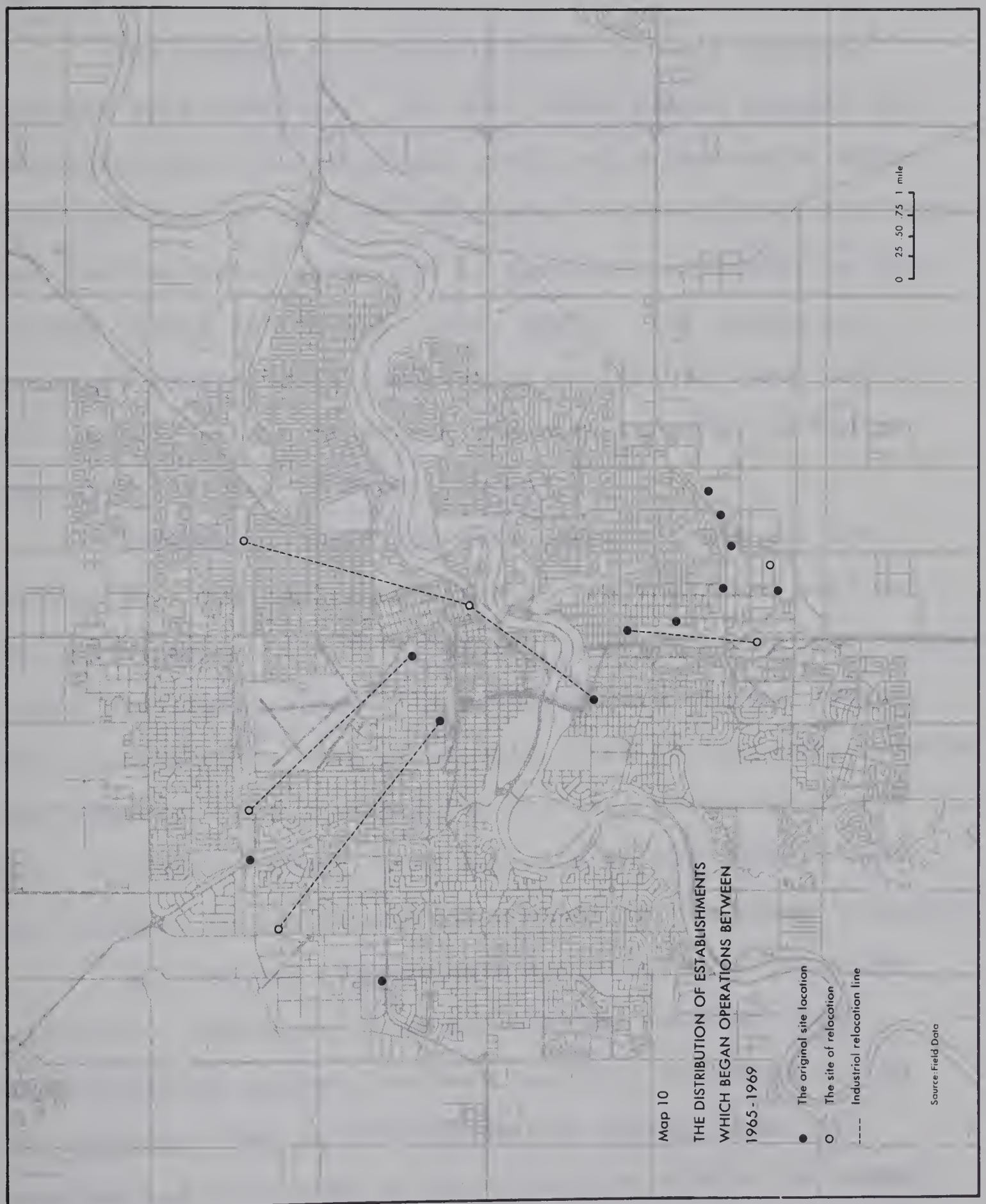
o The site of relocation

---- Industrial relocation line

Source: Field Data

0 .25 .50 .75 1 mile


Map 9
THE DISTRIBUTION OF ESTABLISHMENTS
WHICH BEGAN OPERATIONS BETWEEN
1960 - 1964
The original site lacatian
The site af relacation
Industrial relacatian line
Source: Field Data
0 .25 .50 .75 1 mile


0 .25 .50 .75 1 mile
Map 10
THE DISTRIBUTION OF ESTABLISHMENTS
WHICH BEGAN OPERATIONS BETWEEN
1965-1969
The original site location
The site of relocation
Industrial relocation line
Source: Field Data

location become unfavourable. Some 53 percent of the firms interviewed had relocated within Edmonton at some time in their past.

The reasons for dissatisfaction with a previous location were numerous. The most often quoted reasons for relocation are increased land costs, an unfavourable situation and lack of room for expansion. Over half of the firms that had relocated gave lack of space for expansion as the primary reason for moving (Table XXVI). The second most important reason was a combination of lack of space and an unfavourable situation within the city in terms of market proximity and poor transport access.

Certain of the firms gave other reasons for their relocation. The desire of firms to own their own land was the most common: one firm desired to own its own land because it had previously shared its premises with another company. Two establishments were previously sited on land unfavourable for industry. One firm had had its land purchased by the city, whilst the other found its site in the central area too valuable for an enterprise engaged in the metal industries.

All but one company were satisfied with their new locations. Seventeen firms had already expanded their facilities and another ten were planning to expand in the near future. The one firm which was unhappy with its location had only moved a short distance within the present central area. This relocation had occurred before the central area had reached its present extent and the new site had been

TABLE XXVI

UNFAVOURABLE ASPECTS OF SITE

WHICH FORCED FIRMS TO RELOCATE

ASPECTS	NUMBER OF OCCASIONS CITED
Increase in rent	4
Lack of room for expansion	31
Site was in an unfavourable location within the city	6
Other	7

Source: Field Data

surrounded by "bush." However, the expansion of the central area had enveloped the site so that at present it is described as being highly unsatisfactory due to the lack of space and congestion.

Evaluation of Present Sites

All the firms sampled, with only two exceptions, were satisfied with their present locations. The availability of land for expansion was the most common reason for this satisfaction (Table XXVII). The availability of premises on the site when locating or relocating was another aspect which firms considered favourable.

A low rent for the property was not always mentioned as a favourable aspect. This attitude is not due to high rents, but is the result of many firms owning their own property. Consequently, it was not considered an aspect of the site. The desire to own their own property was the motivation for some firms to relocate. Many enterprises listed other aspects of their site which they considered favourable. Seventeen firms claimed that proximity to their immediate Edmonton market was an attraction of their location, whilst fifteen considered good intra-city transport access a major advantage. This is despite transport not being considered an important factor in the decision to locate in Edmonton.

There appears to be one anomaly in the evaluation of the present sites of the metal industries. As has been indicated, many of the firms considered the possibilities for

TABLE XXVII

THE FAVOURABLE ASPECTS OF FIRMS PRESENT LOCATIONS

ASPECTS	NUMBER OF OCCASIONS CITED
Low rent	21
Suitable premises were already available	38
Room for expansion	51
Other	36

Source: Field Data

expansion on their sites a favourable aspect (Table XXVIII). However only twenty firms are planning to expand their facilities in the near future, though forty-four have expanded their facilities at some time in the past. That forty-five firms should not be planning any immediate expansion may be due to the slight retardation in the economy in the summer of 1970. However they are possibly hopeful that the situation will improve and that if they need to expand their facilities they have the sapce available. Therefore they consider the provision of land for expansion a favourable aspect.

Conclusion

The indirect and direct influences of the development of the oil industry led to a rapid growth in the metal industries. Prior to 1939 the intra-urban location of the metal industries was generally dispersed, although concentrations within certain sectors of the city were becoming evident. The early pattern of location was along transport routes. With the rapid growth of the city a need for zoning arose. Consequently various areas were set aside for industry designated by their past "performance." The sectors for the metal industries are in the north-west and south-east. Any subsequent development has mainly occurred in these sectors.

The north-west district is characterised by the relatively new building and clean appearance. Firms are generally smaller but each site has sufficient storage space. The south-east district is far less compact and haphazard in

appearance and it would seem that no control has been exercised on the type of buildings constructed. Generally, the area has more storage space and is not so compact. If present trends in growth are to continue, it would seem to be in these Industrial Districts which would lead to an intensifying of the present intra-urban location of the metal industries.

CHAPTER VIII

SUMMARY AND CONCLUSIONS

The objective of this study was to analyze both the urban growth and intra-urban changes of the metal industries in Edmonton. The metal industries in the first part of the twentieth century had been oriented primarily to the local market but the development of the oil industry and subsequent growth of the city saw a change in the structure of the industries and the expansion of the spatial extent of markets. At the same time there were important changes in the intra-urban location.

The sample of firms were interviewed to determine the main factors which had influenced their decision to locate in Edmonton. These factors were also examined to see how important they were considered to be in the location of these industries at present. A further study was made of the evolution of the intra-urban pattern of location of these industries over the period from 1910 to 1969. This traced the development of spatial concentrations within the city as well as determining the factors causing intra-urban relocation.

The first part of the study examined the factors that had influenced entrepreneurs to locate in Edmonton. The main factor entrepreneurs considered important was the potential of local and regional markets. The personal

element was the other factor that had strongly influenced entrepreneurs to locate in the city. The remaining factors generally thought to affect the entrepreneurial location decisions, such as labour, power, materials and transport, were not considered to have a significant degree of influence upon the decision to locate in Edmonton.

The strong influence of market potential is not surprising considering the economic growth that has occurred in Alberta. The new markets of the oil and construction industries have been among the major reasons for the growth of the metal industries. In fact so great has been the influence of the market potential that it overcame the disadvantages of a lack of local sources of materials and their associated high transport costs and a generally unskilled labour force. The importance of the personal element revealed the imperfect knowledge and uncertainty which exists in the metal industries. The personal element influenced the location decisions of newer and smaller firms established by local entrepreneurs. It can be assumed that the lack of knowledge of these entrepreneurs and uncertainty of other economic environments together with the security offered by a familiar economic environment led to the decision to locate in Edmonton. Many of these smaller firms lend credence to the theory of "adoption" and "adaptation." Entrepreneurs realizing the market demands entered into production hence "adapting" to the economic environment. However at the same time by manufacturing products for which there was a demand

they fitted into the econimic environment. Consequently they were "adopted" by the economic environment.

The second part of the thesis studied the location factors in closer detail. The growth and spatial extent of markets were analysed. It was revealed that the predominant markets of the early industries were confined to Edmonton and the immediate region. In time though the spatial extent of markets had grown with increasing predominance of markets in the rest of Alberta and Western Canada and the relative decline in the importance of the Edmonton market.

Time had played an important role in the growth of markets. The longer a firm had been established in Edmonton the greater the likelihood of the spatial extent of its markets expanding. It was significant that the percentage of firms whose market distribution had always been the same was highest amongst the younger firms. The growth of Edmonton had opened up new markets and firms were beginning to take advantage of this potential.

The influence of materials, transport, power and labour was not considered important by entrepreneurs in the location decision. Despite this certain trends could be discerned. The lack of local materials sources led to materials being obtained from many distant places. Sources of materials were not restricted to Eastern Canada but were found throughout North America and overseas. Many materials originated from the United States, the source being the parent company of the Edmonton branch plant. Other materials were

obtained from Europe and Japan. Rail transportation did not dominate as a means of conveyance for materials. Manufacturers were beginning to rely more upon trucking operations. No materials from the United States were conveyed solely by rail but were transported either by road or a combination of road and rail.

The insufficient supply of skilled labour had been mainly felt by the newer sectors of the metal industries which had grown since 1950. Many firms operated training programmes for their employees but it appeared that the supply of skilled labour was increasing. Some firms which had originally instituted training programmes due to the shortage of skilled labour had since dropped them. Despite twenty-one firms insisting that the present supply of skilled labour was insufficient, they had all grown in either numbers employed or spatial extent of markets or had expanded their facilities or relocated due to a need for more space.

By being available at all locations, power has no influence upon the location decision and can be considered a neutral factor. The disadvantageous situation with regard to the other factors previously discussed are not considered important in affecting the entrepreneurial decision. The market potential offered by an Edmonton location overcomes these disadvantages to the extent that the majority of entrepreneurs did not rank these factors highly as influencing their location.

The final part of the study dealt with the evolving

intra-urban location of the metal industries. The pattern of location and relocation was examined as the development of areas of concentration within the city and the relocation in different sectors of the city are a facet of growth. Originally the metal industries had located on the periphery of the central area. However the outward growth of Edmonton and the associated problem of space for industry led to the metal industries locating in the suburbs. Since 1950 there has been a tendency for location in the north-west and south-east of Edmonton. The pattern has intensified with designation of these districts as Industrial Districts based on the "performance" of industries already located there. The reasons for relocation were numerous but the most common were the need for new sites to accommodate the growth of the firms. The majority of establishments were satisfied with their present sites and considered the most favourable aspect the availability of room for further expansion.

The intra-urban location of the metal industries developed over a period of fifty-nine years. Industrial zoning and the need for more space to accommodate exapnsion due to growth of markets has led to a definite concentration of the metal industries since 1950. The implementation of zoning bylaws and advantages of a location in an industrial area of associated industries would suggest that any further growth would lead to further intensifying of the present concentration of the metal industries.

The metal industries have grown through time and

expanded the spatial extent of their markets. It was the potential offered by markets, the result of overall growth of Edmonton since 1950, which led to the growth of the metal industries and nullified the disadvantageous situation regarding labour availability, materials and transport.

This growth of the metal industries reflects the validity of North's (1955) theory of regional economic growth in North America. Originally the export base of Edmonton was composed of products from the tertiary sector and the metal industries were purely "residentiary." The early metal industries only served the demands of the city and were comprised of blacksmith's shops, machine shops and sheet metal shops. The oil boom and increase in the construction industry opened new markets for metal products. New establishments began operations to satisfy these demands and in time began exporting their products to more distant markets. As a result, the metal industries expanded to become part of the city's export base.

The study was successful in determining the reasons for the growth of the metal industries and revealing the development of the spatial extent of markets. Hopefully it would be feasible to apply such an approach to a study of other industries engaged in secondary manufacturing.

During the course of research it became apparent that certain aspects were worthy of being expanded to become major research projects in themselves. The first is the growth of the spatial extent of markets. Smaller market

areas could be studied and instead of examination being restricted to the year firms began operations and the present, could be looked at on a five-year time basis. Therefore, the evolution of the market pattern would be traced in greater detail.

Another aspect which could be developed is the role of the personal element. Much research has neglected the personal factor in the location decision, yet this study has revealed it has an importance completely unexpected. Large companies are concerned with economic considerations in their location decisions and consequently the personal factor is unimportant. However, the majority of manufacturing establishments are small and this study reveals the importance of the personal factor in the decisions of such establishments.

Finally there is a wide scope for research into the factors and events that shape the intra-urban pattern of industrial location. To fully understand such patterns of location there must be a complete understanding of the effects of events in a city's history. Relocation within the urban area is a major aspect of an industry's development and warrants far greater attention. The reasons for such relocations can be studied to a greater degree. Land costs and rents could be examined as well as the physical needs of the firm. Such a study would allow urban authorities to realize the needs of industry and plan accordingly.

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APPENDIX A

THE SAMPLE

APPENDIX A

THE SAMPLE

The Metal Industries

For the purposes of this study the metal industries are taken to be comprised of the Major Groups twelve, thirteen and fourteen as listed in the Standard Industrial Classification Manual of the Dominion Bureau of Statistics. These, respectively, are the Primary Metal Industries, the Metal Fabricating Industries, and Machinery Industries (excluding electrical machinery). The Transport Equipment Industries are not included in these three groups and subsequently were not considered as part of the metal industries. Within each of these groups are various sub-categories which provide a more detailed guide to the type of manufacturing.

Sources of Information

Information sources on the number and type of firms in the Edmonton metal industries are few. The most easily accessible and up-to-date source was the Industrial Directory of the City of Edmonton (Edmonton, 1970). The Directory listed firms according to the S.I.C. Many of the firms listed appeared in two or more sub-categories; but for the purpose of the sample were included only in the sub-category in which they first appeard. This procedure gave a total

number of 216 establishments in the metal industries.

The Sample

A 30 percent random sample, 65 establishments, was selected for study. Considering the small total population, it was decided not to stratify the sample. Only three categories were not represented in the original sample, but in each case, the category was comprised of firms listed previously. These categories were the Smelting and Refining, Aluminum Rolling, Casting and Extruding and Copper and Alloy Rolling, Casting and Extruding Industries.

Originally the Agricultural Implements Industry (three establishments) was represented. However, the selected firm refused an interview and was replaced by another firm randomly selected from the total population. The distribution of the sample by S.I.C. category is shown in Table A1.

Once in the field, inaccuracies in the original list of firms became apparent. Three of the firms listed as manufacturers were in fact, solely distributors. In one case, the firm had not manufactured a product for ten years. Despite this set-back, the firms interviewed were still taken from the Industrial Directory as it was the only source which classified firms by industry. Other set-backs were two firms refusing interviews and three having gone out of business. To keep the 30 percent sample, these firms were replaced by others randomly chosen.

TABLE A1

THE DISTRIBUTION OF THE SAMPLE BY S.I.C. CATEGORIES

S.I.C.	TOTAL NUMBER OF FIRMS	SAMPLE NUMBER OF FIRMS	PERCENTAGE
Iron and Steel Mills	5	2	40
Steel Pipe and Tube Mills	11	6	54.6
Iron Foundries	2	1	50
Metal Rollings, Castings and Extrusion Manufacturers	2	2	100
Boiler and Plate Works	8	2	25
Fabricated Structural Metal Industry	18	3	16.6
Ornamental and Architectural Metal Industry	30	8	26.6
Metal Stamping, Pressing and Coating Industry	38	15	39.4
Wire and Wire Product Manufacturers	5	2	40
Hardware, Tool and Cutlery Manufacturing	11	5	45.4
Machine Shops	40	7	17.5
Miscellaneous Metal Fabricating Industries	8	3	37.5
Equipment Manufacturers	28	9	32.1

Source: Industrial Directory, 1970

APPENDIX B

THE QUESTIONNAIRE

Date _____

Time _____

Address _____

1. Name of firm _____

2. Person interviewed _____

   Position _____

3. Is the firm

   a) a local firm that has always been located in the city?_____

   b) a branch plant that was previously located elsewhere in Alberta?_____

      If so, what is the name and location of the Parent Firm?

   c) a branch plant?

      If so, what is the name and location of the Parent Firm?

   d) relocation of an out-of-province firm?_____

   e) relocation of an in-province firm?_____

4. What date was the firm established?

PRODUCTS

5. What are your main products?

   a)

   b)

   c)

   d)

   e)

6. Is your product a) final?_____ b) Non-final?_____

7. If it is Final is it

   a) sold directly to the general public?_____

   b) sold to another firm for installation?_____

8. If your product is non-final, what firms do you pass the product on to for further processing?

   a)

   b)

   c)

   d)

   e)

RAW MATERIALS

9. What are your main materials?

a) d)

b) e)

c)

10. In terms of rank could you rank the materials in order of importance?

a) d)

b) e)

c)

11. What are your sources of material?

a) d)

b) e)

c)

12. What were your sources of material when the firm started?

a) d)

b) e)

c)

POWER

13. What is your source of power?

a) b) c)

14. Did this source of power have any influence in your choice of location?

a) Yes_____ b) No _____

LABOUR

15. How many people does the firm employ in 1970? _____

a) Male_____ b) Female_____

16. How many people did the firm employ in the year the firm started?

a) Male_____ b) Female_____

17. Do you employ a large amount of seasonal labour? a) Yes_____ b) No_____

18. If you do, when is your greatest demand for labour?_____

19. Do you have a large turnover of labour? a) Yes _____ b) No_____

20. Do you need a large percentage of skilled labour on your labour force?

a) Yes_____ b) No_____

21. Is there a sufficient supply of skilled labour available in 1970 or do you have to train your own skilled labour?

22. Was there a sufficient supply of skilled labour available in the year the firm started or did you have to train your own skilled labour?

23. Has the attitude of labour been favourable? a) Yes_____ b) No_____

MARKET

24. What are your % sales in 1970 for:

a) Edmonton _____

b) The rest of Alberta _____

c) Western Canada (Excluding Alberta) _____

d) Eastern Canada _____

e) Other _____

25. What were your % sales in the year the firm started for the following:

a) Edmonton _____

b) The rest of Alberta _____

c) Western Canada (Excluding Alberta) _____

d) Eastern Canada _____

e) Other _____

TRANSPORTATION

26. What type of transportation does the firm use for transporting its materials?

a) Road _____ b) Rail _____ c) Air_____

27. What type of transportation does the firm use for transporting the finished product?

a) Road_____ b) Rail _____ c) Air_____

THE LOCAL ENTREPRENEUR

28. Where is the home town of the person who started the firm?_____

Or where is the location of the main company?_____

29. What other cities or regions, if any, were considered as possible locations?

30. If your or the firm had to make the location decision again would you still arrive at the same decision in the light of your experience?

a) Yes_____ b) No _____

31. What reasons made you decide to locate in Edmonton?

SITE

32. Has there been any change of location within the city?

a) Yes_____ if so, what was your previous address?_____

b) No _____

33. What were the reasons for the change in location?

a) Increase in rent _____

b) Lack of room for expansion _____

c) The site was in an unfavourable location within the city _____

d) Other_____

34. What are the favourable aspects of this location?

a) Low rent _____

b) Suitable premises were already available _____

c) Room for expansion _____

d) Other_____

35. Has the firm increased the size of the plant on this site?

a) Yes_____ b) No_____

36. Do you have any plans for expanding the size of your plant here in the near future? a) Yes_____ b) No _____

37. If you are planning to expand, what are the reasons?

38. Do you have any plans for relocating the plant somewhere else in the city?

a) Yes_____ b) No_____

39. If you do have plans for relocating, what are the reasons?

40. Would you consider relocating somewhere else in the Province? a) Yes___ b) No____

41. Would you consider relocating somewhere outside the Province? a) Yes___ b) No____

42. Could you rank these factors in order of importance as they affected the decision to locate in Edmonton?

a) Market _____

b) Power _____

c) Labour _____

d) Transport _____

e) Materials _____

f) Site _____

g) Edmonton is the owner's home town _____

The Questionnaire

Much of the basic data required in order for this study to be carried out had to be obtained by questionnaire, for little accurate information was available from other sources. A modified form of the questionnaire used by Greenhut and Colberg (1962) in their study of manufacturing in Florida, was drawn up and a pilot survey undertaken. From this survey the form of the questionnaire was further modified. The main modifications were to phrase the questions in such a way that the interviewee could answer them without fear of disclosure. This is an important consideration when dealing with firms employing under ten people. The other modifications were to frame the questions so that they be better understood by the person being interviewed.

The first section was designed for the purpose of establishing the type of firm, in terms of branch plant, original plant or relocated plant, and the length of time the plant had been located in Edmonton. The part asking for details of main products was an attempt to provide some criteria for later classification, but the multitude of answers negated this idea. Consequently classification of firms by industry had to be based on the S.I.C.

In asking about raw materials, question ten was adapted from asking for the percentage of each raw material used to one of ranking raw materials in order of importance by cost. This was due to firms giving vague answers to the question in its original form. However the modified question

led to no greater classification as had been hoped. Also, due to the broad scope of the industry studied the raw materials used were more numerous than expected. This resulted in little analysis of raw materials being possible, though the responses on sources of materials produced the expected results.

Firms were prepared to discuss the labour situation and the responses to questions on this factor were good. The firms were willing to give their spatial markets as a percentage of total sales, the question being so framed to avoid no response due to a fear of disclosure.

The remaining questions all obtained a satisfactory response. The purpose of question thirty-one being open-ended was to provide a check on the ranking of location factors in question forty-two. It was placed in its position in the questionnaire as it was related to the enquiries as to the home town of the entrepreneur or parent company and allowed a sufficient time lapse before the interviewees ranked the factors of location.

In asking about the site location, the intention was two-fold. Firstly it was to establish where firms located or relocated in the city. The second objective was to obtain an assessment of the sites and to see if there were indications of growth. Generally the questionnaire proved satisfactory in its construction. However, as the research was carried out it became obvious that further modifications would be needed in the instance of further research on the same lines.